NATIONAL AERONAUTICS AND SPACE ACT

UNIVERSITY
OF MICHIGAN

JUN 10 1958

MAIN
READING ROOM

HEARINGS

BEFORE THE

SPECIAL COMMITTEE
ON SPACE AND ASTRONAUTICS
UNITED STATES SENATE

EIGHTY-FIFTH CONGRESS

SECOND SESSION

ON

S. 3609

A BILL TO PROVIDE FOR RESEARCH INTO PROBLEMS OF FLIGHT WITHIN AND OUTSIDE THE EARTH'S ATMOSPHERE, AND FOR OTHER PURPOSES

MAY 6, 7, AND 8, 1958

PART 1

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NATIONAL AERONAUTICS AND SPACE ACT OF 1958

TUESDAY, MAY 6, 1958

UNITED STATES SENATE,
SPECIAL COMMITTEE ON SPACE AND ASTRONAUTICS,
Washington, D. C.

The special committee met, pursuant to call, at 10:30 a. m., in room 457, Senate Office Building, Senator Lyndon B. Johnson (chairman) presiding.

Present: Senators Lyndon B. Johnson (chairman), Green, McClellan, Anderson, Symington, Bridges, Wiley, Hickenlooper, Saltonstall and Bricker.

Also present: Edwin L. Weisl, consulting counsel; Eilene Galloway, special consultant; Dr. Glen P. Wilson, technical coordinator; Gerald W. Siegel, Stuart French, and Solis Horwitz, professional staff members.

Senator JOHNSON. Will the committee please come to order.

I am informed that we do not have microphones for the audience and therefore it is necessary that those of us at the table speak louder than usual if we expect those in the hearing room to follow us.

First of all, two of our most outstanding members are in a leadership conference at the White House this morning and will be delayed.

In view of the fact that General Doolittle's time is limited and he expects to leave for Europe after he completes his testimony here, we thought we should go ahead as scheduled.

I should like to ask the members of the staff who have worked on this hearing to please stand as I present them so that all of the members of the committee may know them.

Mr. Edwin Weisl, please stand.

Mr. Solis Horwitz and Mr. Gerald Siegel; Dr. Glen Wilson and Mrs. Eilene Galloway.

(Those named arose momentarily.)

We have a number of other staff members who have worked with us but who are not here this morning, and we are very grateful for the outstanding service they have performed.

We are here today to begin consideration of a bill which will create a Federal agency with the specific responsibility of guiding the Nation in the exploration of outer space. It will be printed in the record at this point.

[S. 3609, 85th Cong., 2d sess.]

A BILL to provide for research into problems of flight within and outside the earth's atmosphere, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "National Aeronautics and Space Act of 1958."

DECLARATION OF POLICY

SEC. 2. The Congress hereby declares that the general welfare and security of the United States require that adequate provision be made for research into, and

the solution of, problems of flight within and outside the earth's atmosphere and that provisions also be made for the development, testing, and operation for research purposes of aircraft, missiles, satellites, and other space vehicles, manned and unmanned, together with associated equipment and devices. The Congress further declares that such activities should be directed by a civilian agency exercising control over aeronautical and space research sponsored by the United States, except insofar as such activities may be peculiar to or primarily associated with weapons systems or military operations, in which case the agency may act in cooperation with, or on behalf of, the Department of Defense. These activities should be conducted so as to contribute materially to one or more of the following policy objectives: (1) the expansion of human knowledge of phenomena in the atmosphere and space, (2) the improvement of the usefulness, performance, safety, and efficiency of aircraft, (3) the development and operation of vehicles capable of carrying instruments, equipment, and living organisms through space, (4) the preservation of the role of the United States as a leader in aeronautical and space science and technology, (5) the making available to agencies directly concerned with national defense of discoveries that have military value or significance, (6) cooperation by the United States with other nations and groups of nations in work done pursuant to this Act and in the peaceful application of the results thereof, and (7) the most effective utilization of the scientific and engineering resources of the United States and the avoidance of duplication of facilities and equipment.

NATIONAL AERONAUTICS AND SPACE AGENCY

SEC. 3. There is hereby established the National Aeronautics and Space Agency, hereinafter called the "Agency". The Agency shall be headed by a Director, who shall be appointed by the President by and with the advice and consent of the Senate, shall receive compensation at the rate of $22,500 per annum, and, except as otherwise provided in this Act, shall exercise the functions of the Agency. The Director may from time to time make such provisions as he may deem appropriate authorizing the performance by any officer, employee, or administrative unit under his jurisdiction of any of his functions under this Act.

NATIONAL AERONAUTICS AND SPACE BOARD

SEC. 4. (a) There is hereby established the National Aeronautics and Space Board, hereinafter called the "Board", which shall be composed of not to exceed seventeen members appointed by the President.

(1) No more than eight of the members of the Board shall be designated from appropriate departments or agencies of the Government of the United States, including at least one who shall be from the Department of Defense.

(2) Members of the Board other than those appointed under subsection (a) (1) of this section shall be eminent in science, engineering, technology, education, or public affairs and shall be selected solely on the basis of established records of distinguished achievement, and shall be appointed for terms of four years from the date of expiration of the terms of the members whom they succeed, except that in making initial appointments of such members the President may make appointments for such shorter terms as he deems appropriate.

(b) The Chairman of the Board shall be designated from time to time by the President from among the members appointed under subsection (a) (2) of this section. Such members shall be paid travel expenses and per diem in accordance with the provisions relating to persons serving without compensation under section 5 of the Administrative Expenses Act of 1946, as amended (5 U. S. C. 73 b-2).

FUNCTIONS OF THE BOARD

SEC. 5. (a) The Board shall meet at least four times each year and shall advise the President and the Director concerning policies and programs of the Agency. The Board shall make an annual report and from time to time such other reports to the President as it deems appropriate.

(b) The Board may make recommendations to the President with respect to the appointment of the Director, and the Director shall not be appointed until the Board shall have had a reasonable opportunity to make such recommendations.

(c) The Board shall be consulted by the Director prior to—

(1) initiation or substantial modification of policies or programs of the Agency;

(2) transmittal of any request for appropriations to the Bureau of the Budget pursuant to the Budget and Accounting Act, 1921, as amended (31 U. S. C. 1 et seq.);

(3) establishment of major constituent organizational units of the Agency, and the assignment of major functions or groups of functions thereto; and

(4) appointment by the Director of the heads of major constituent units.

FUNCTIONS OF THE AGENCY

SEC. 6. (a) The Agency shall—

(1) develop a comprehensive program of research in the aeronautical and space sciences:

(2) plan, direct, and conduct scientific studies and investigations of the problems of manned or unmanned flight within or outside the earth's atmosphere with a view to their practical solution;

(3) develop, test, launch, and operate aeronautical and space vehicles;

(4) arrange for participation by the scientific community in planning scientific measurements and observations to be made through use of aeronautical and space vehicles, and conduct or arrange for the conduct of such measurements and observations; and provide as appropriate for dissemination of data collected; and

(5) submit to the President for transmittal to the Congress an annual report of operations and accomplishments.

(b) In performance of the above functions the Agency is authorized—

(1) to make, promulgate, issue, rescind, and amend rules and regulations governing the manner of its operations and the exercise of the powers vested in it by law;

(2) subject to the civil service laws, to select, appoint, employ, and, subject to such regulations as the President may prescribe and without regard to the Classification Act of 1949, as amended (5 U. S. C. 1072 et seq.), and the Federal Employees Pay Act of 1945, as amended (5 U. S. C. 901 et seq.) fix and adjust, as nearly as consistent with the public interest and on the basis of equal pay for equal work at rates which are reasonably comparable with prevailing rates paid by non-Federal employers for similar work, compensation of such officers and employees as may be necessary to carry out the provisions of this Act;

(3) to acquire, construct, improve, repair, operate, and maintain laboratories, research and testing sites and facilities, manned and unmanned aeronautical and space vehicles, quarters and related accommodations for employees and dependents of employees of the Agency, and such other real and personal property, or any interest therein, as the Agency deems necessary within and outside the continental United States; to lease to others such real and personal property; to sell and otherwise dispose of real and personal property in accordance with the provisions of the Federal Property and Administrative Services Act of 1949, as amended (40 U. S. C. 471 et seq.); and to provide by contract or otherwise for cafeterias at its installations and to purchase and maintain equipment therefor; the receipts therefrom shall be deposited to a special fund in the Treasury which shall remain available for obligation and expenditure in connection with such operations and purchase and maintenance of equipment;

(4) to accept gifts or donations of services, money, or property, real, personal, or mixed, tangible or intangible, and to make grants to further the authorized purposes of the Act;

(5) without regard to section 3648 of the Revised Statutes, as amended (31 U. S. C. 529), to enter into and perform such contracts, leases, cooperative agreements, or other transactions as may be necessary in the conduct of its work and on such terms as it may deem appropriate, with any agency or instrumentality of the United States, or with any State, Territory, or possession, or with any political subdivision thereof, or with any person, firm, association, corporation, or educational institution;

(6) to use, with their consent, the services, equipment, personnel, and facilities of Federal and other agencies with or without reimbursement and on a similar basis to cooperate with other public and private agencies and instrumentalities in the use of the services, equipment, and facilities of the Agency. In addition to authority to use provided by this subsection and, notwithstanding any other provision of law, any governmental agency or component thereof is authorized to transfer to the Agency, without reimbursement, supplies, equipment, aircraft, missiles, space vehicles, and related parts other than administrative supplies or equipment;

(7) to appoint such advisory committees as may be appropriate for purposes of consultation and advice to the Agency in performance of its functions;

(8) to obtain services as authorized by section 15 of the Act of August 2, 1946 (5 U. S. C. 55a) at rates not to exceed $100 per diem;

(9) when determined by the Director to be necessary and subject to such security investigations as he may determine to be appropriate, to employ aliens without regard to statutory provisions prohibiting payment of compensation to aliens;

(10) to employ and compensate retired commissioned officers of the United States at the rate established for the positions so occupied by them within the Agency, less the amount of their retired pay: *Provided*, That, when the retired pay amounts to or exceeds the rate of compensation established for the position occupied, such person shall be entitled to the pay of the Agency position, or the retired pay, whichever he may elect;

(11) with the approval of the President, to enter into cooperative agreements under which members of the Army, Navy, Air Force, and Marine Corps may be detailed by the appropriate Secretary for services in performance of functions under this Act to the same extent to which they might be lawfully assigned in the Department of Defense;

(12) to the extent the Director finds it will contribute to achievement of the objectives of this Act or to the more effective functioning of the Agency, to conduct or provide training and to assign employees to research, study, or training at Federal or non-Federal facilities, including public or private agencies, institutions of learning, laboratories, industrial or commercial organizations or other appropriate organizations or institutions, foreign or domestic, and, if the Director deems it appropriate, to pay in whole or in part, the following: The salaries of such employees for the periods of such training or assignments; the cost of their transportation and per diem in lieu of subsistence in accordance with the Travel Expenses Act of 1949, as amended (5 U. S. C. 834 et seq.); necessary expenses incident to their training or assignment, including tuition, fees, study materials, and other customary expenses. The Agency shall require any employee who accepts such a leave or assignment to agree in writing to return to and, unless involuntarily separated therefrom, to remain in the service of the Agency for a period equal to three times the length of any time off with pay granted such employee without charge to annual leave for the purpose of such training or assignment. Any employee who fails to fulfill such agreement shall be required to reimburse the Government for whatever portion the Director determines to be equitable of the transportation, per diem in lieu of subsistence, and other expenses incident to such training or assignment paid by the Government. To the extent authorized by the Director, contributions may be made by private sources and accepted by employees receiving training in non-Federal facilities without regard to the provisions of section 1914 of Title 18 of the United States Code;

(13) to authorize employees to attend meetings concerned with functions or activities of the Agency including improved conduct, supervision, or management of such functions or activities, and to pay the whole or any part of the expenses of such attendance;

(14) (a) to consider, ascertain, adjust, determine, settle, and pay, on behalf of the United States, any claim for money damage of $5,000 or less against the United States for bodily injury, death, or damage to or loss of real or personal property resulting from the conduct of the Agency's functions as specified in subsections 6 (a) (2), (3), and (4), where such claim is presented to the agency in writing within two years after the accident or incident out of which the claim arises;

(b) If the Agency considers that a claim in excess of $5,000 is meritorious and would otherwise be covered by this subsection it may pay the claimant $5,000 and report the excess to Congress for its consideration;

(c) except as provided in (b) of this subsection, no claim may be paid under this section unless the amount tendered is accepted by the claimant in full satisfaction;

(15) to arrange with the Civil Service Commission for the conduct of appropriate security or other personnel investigations of employees of the Agency, contractors and subcontractors, and their employees, as the Director deems necessary in the conduct of official functions of the Agency: *Provided*, That in the event an investigation made under this authority develops any data reflecting that the individual who is subject of the investigation is of

questionable loyalty, the matter shall be referred to the Federal Bureau of Investigation for the conduct of a full field investigation, the results of which will be furnished to the Agency;

(16) to direct such of its officers and employees as it deems necessary in the public interest to carry firearms while in the conduct of their official duties. The Agency may also authorize such of those employees of its contractors engaged in the protection of property owned by the United States and located at facilities owned by or contracted to the United States, as it deems necessary in the public interest, to carry firearms while in the conduct of their official duties.

SECURITY

SEC. 7. (a) The Atomic Energy Commission may authorize any of its employees, or employees of any contractor, prospective contractor, licensee, or prospective licensee of the Atomic Energy Commission or any other person authorized access to Restricted Data by the Atomic Energy Commission under subsection 145 b. of the Atomic Energy Act of 1954, as amended (42 U. S. C. 2163), to permit any member of the Board or an advisory committee, or any officer, employee, contractor, or employee of a contractor of the Agency to have access to Restricted Data required in the performance of his duties and so certified by the Director: *Provided, however,* That the Director or his designee has determined, in accordance with the established personnel security procedures and standards of the Agency, that permitting the member of the Board or an advisory committee, or employee, contractor, or employee of a contractor to have access to such Restricted Data will not endanger the common defense and security: *And provided further,* That the Director finds that the established personnel and other security procedures and standards of the Agency are adequate and in reasonable conformity to the standards established by the Atomic Energy Commission under section 145 of the Atomic Energy Act of 1954, as amended (42 U. S. C. 2165).

(b) Whoever willfully shall violate, attempt to violate, or conspire to violate any regulation or order as shall be promulgated by the Director for the protection or security of any laboratory, station, base or other facility, or part thereof, or any aircraft, missile, spacecraft or similar vehicle existing, or later conceived, or part thereof, or other property or equipment in the custody of the Agency shall be guilty of a misdemeanor and upon conviction thereof shall be liable to a fine of not to exceed $5,000, or to imprisonment of not more than one year, or both, except that whoever commits such an offense with intent to injure the United States or with intent to secure an advantage to any foreign nation, shall, upon conviction thereof be punished by a fine of not more than $20,000 or by imprisonment for not more than twenty years or both.

(c) Section 1114 of title 18, United States Code, is hereby amended by striking out "or any officer or employee of the Indian field service of the United States," and inserting in lieu thereof "any officer or employee of the Indian field service of the United States, or any officer or employee of the National Aeronautics and Space Agency directed to guard and protect property of the United States under administration and control of the National Aeronautics and Space Agency,".

TRANSFER OF RELATED FUNCTIONS

SEC. 8. For a period of three years after the effective date of this Act the Agency, with the concurrence of the head of the department or agency concerned and with the approval of the President, may transfer to itself any functions (including powers, duties, activities, facilities, and parts or functions) of such department or agency or of any officer or organizational entity thereof which relate primarily to the functions of the Agency as set forth in section 6 hereof. In connection with any such transfer the President may, under authority of this section or under other applicable authority, provide for appropriate transfers of records, property, civilian personnel, and funds.

APPROPRIATIONS

SEC. 9. (a) There are hereby authorized to be appropriated without fiscal year limitation such sums as may be necessary and appropriate for the carrying out of the provisions and purposes of this Act.

(b) Any funds appropriated for the construction of facilities may be used for emergency repairs of existing facilities when such existing facilities are made

inoperative by major breakdown, accident, or other circumstances and such repairs are deemed by the Director of the Agency to be of greater urgency than the construction of new facilities.

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

SEC. 10. (a) The National Advisory Committee for Aeronautics on the effective date of this Act shall cease to exist as such and all real and personal property, personnel, funds, and records of that organization are hereby transferred to the Agency. The Agency shall wind up any outstanding affairs of the National Advisory Committee for Aeronautics not otherwise provided for in this Act. Except as otherwise directed by the President, the members of the National Advisory Committee for Aeronautics shall serve as the members of the National Aeronautics and Space Board until their successors are appointed by the President as provided in section 4 of this Act.

(b) Section 2302 of title 10 of the United States Code is amended by deleting the phrase "or the Executive Secretary of the National Advisory Committee for Aeronautics." and by inserting in lieu thereof the phrase "or the Director of the National Aeronautics and Space Agency."; and, section 2303 of said title 10 is amended by deleting the phrase "The National Advisory Committee for Aeronautics." and by inserting in lieu thereof the phrase "The National Aeronautics and Space Agency."

(c) Section 1 of the Act of August 26, 1950 (5 U. S. C. 22–1), is amended by deleting the phrase "National Advisory Committee for Aeronautics" wherever it appears and by inserting in lieu of the deleted words, in each instance, the phrase "National Aeronautics and Space Agency".

(d) The Unitary Wind Tunnel Plan Act of 1949 (50 U. S. C. 511) is amended by deleting the phrase "The National Advisory Committee for Aeronautics (hereinafter referred to as the 'Committee')" and by inserting in lieu thereof the phrase "The National Aeronautics and Space Agency (hereinafter referred to as the 'Agency')" and is further amended by deleting the word "Committee" wherever it appears and by inserting in lieu thereof, in each instance, the word "Agency".

Senator JOHNSON. I believe it is entirely fair to say that seldom, if ever, has a Congress and an administration faced a more challenging task.

We are dealing with a dimension—not a force.

We are dealing with the unknown—not the known.

While the present is urgent, the real imperative is the future.

What we do now may very well decide, in a large sense, what our Nation is to be 20 years and 50 years and 100 years from now—and, of no lesser importance, our decisions today can have the greatest influence upon whether the world moves toward a millennium of peace or plunges recklessly toward Armageddon.

Our ideal should be to convert outer space into a blessing for mankind, rather than a threat of the destruction of civilization.

A decade ago the Nation and the Congress were faced with the very great challenge of instituting policy with regard to the new force of nuclear fission. Then, as now, questions of peace and war dominated our thoughts and discussions, but it is inappropriate and irrelevant to draw an extended parallel between these two eras.

The challenge of the atomic age, at the beginning, was to harness a vast destructive power to prevent its use in war.

The challenge of the space age, at the beginning now, is to open a new frontier and to permit its use for peace.

Twelve years ago much of our attention was dedicated to choosing between civilian control or military control. I believe that choice is not really before us now. On all sides, there is wide agreement that while space adds a new dimension to the technology of weapons and the strategy of security, the ultimate opportunity of space is not that

of a final battleground. Freemen have no intention of rattling sabers among the stars.

It is appropriate and heartening, I think, that we begin this work now on a base of unity and broad agreement, rather than on a base of disagreement and contention. I see no reason why this spirit cannot be maintained.

The primary legislation before the Committee is legislation drafted by the advisers to the Chief Executive. It has been introduced here, upon request, by myself and by the Senior Senator from New Hampshire.

I know, on the part of the sponsors and I believe on the part of the authors, there is full expectation that public examination and discussion of the terms of the legislation can contribute many strengthening recommendations.

Such constructive contributions will be welcome from any source.

I believe it is well to say, however, that this Committee wishes to confine its deliberations to the issues which are most pertinent and most in need of immediate attention.

We could, of course, receive extensive and all but endless testimony about the possibilities and probabilities of outer space and what it may mean in a technical way. However, more than six months ago a committee of this Senate undertook an extensive and exhaustive study of that kind. No substantial purpose would be served by devoting further time to repetition of such testimony.

Furthermore, there is in the House an eminent committee led by the distinguished gentleman from Massachusetts, Mr. McCormack, which is holding hearings in the same field. We are not here to duplicate those hearings but to act in accordance with the facts which are presented to us.

One of the important features of our legislative system is that it provides checks and balances and assures that in the course of the legislative process there are a number of points at which proposals must be tested, and whatever is missed at one point will usually be found at another.

What is before use now is not a question of whether we should begin the orderly exploration of space but, rather, the question of how such exploration may best be directed and initiated. We are past the point of studying sketches. It is time to get the blueprints drawn and start pouring concrete for the foundation.

There is an obvious need within our Government for a structure and organization to give purpose, direction, and impetus to the national effort. That is what this committee is here to consider and to recommend.

We cannot expect and do not expect to resolve this question for all time to come. Knowing as little as even our best minds know about space, it would be the height of vanity for us to suppose that we could—in an age not yet 12 months old—settle national policy for decades or centuries ahead.

On the contrary, our particular challenge—as I see it—is to devise a pattern which encourages rather than inhibits the full response of American initiative to the infinite challenges of outer space.

If we create the agency which the challenge requires, it will be unlike rather than like anything now existing in the Federal Government. Certainly, it will require the closest attention from the Congress in

the years immediately ahead to make certain that this potential is fully realized. For that reason, we must also make provision for Congress to give permanent attention to this new enterprise.

Space, as I said, is a new dimension. Hence, it in no way detracts from or usurps the role of existing agencies or the programs of committees but, rather, it adds to and greatly expands the role of each. In fact, if our blueprints are proper and our building adequate, we should assure that after this period of transition there will be a diminished need for special agencies and special committees to deal with space.

Space affects all of us and all that we do, in our private lives, in our business, in our education, and in our Government. We shall succeed or fail in relation to our national success at incorporating the exploration and utilization of space into all aspects of our society and the enrichment of all phases of our life on this earth.

We are very much indebted this morning to our first witness, Dr. James H. Doolittle, who is Chairman of the National Advisory Committee for Aeronautics.

Dr. Doolittle, you are no stranger to congressional committees. You have been consulted by Congress on many occasions, and I have never known any time when you did not make a distinct contribution to our deliberations. In this instance, I think you have an unusually good background for this subject.

You have had practical experience in the field of science, engineering, business, and military aviation.

Furthermore, you head an agency that would be directly affected by the measure which has been sent to us by the President.

In order to get some background for your testimony, I am going to place in the record at this point your biography.

Without objection the biography of Dr. James H. Doolittle, vice president and director, Shell Oil Co., Chairman of the National Advisory Committee for Aeronautics, will be included in the record at this point.

(The biography referred to is as follows:)

Dr. Doolittle was born on December 14, 1896, in Alameda, Calif. He received his bachelor of arts degree from the University of California in 1922, and his master of science in 1924, and doctor of science in 1925 from M. I. T.

He was a member of the United States Army Air Corps from 1917–30. From 1930–40 he was manager of the aviation department of the Shell Petroleum Corp. In 1940 he returned to active duty in the Air Corps advancing to lieutenant general in 1944. He was Commander of the 12th Air Force, Strategic Air Force, and the 15th and 8th Air Force. He resigned in 1946 to return to his present position with the Shell Petroleum Corp. He has been Chairman of the NACA since 1956.

Dr. Doolittle has received many awards including the Congressional Medal of Honor. He has served the Government in many capacities including Chairman of the Secretary of War's Board on Enlisted Men-Officer Relationship, the Joint Congressional Aviation Policy Board, and Chairman of the President's Airport Commission. He is a member of the Institute of the Aeronautical Sciences, the Royal Aeronautical Society, and the National Aeronautical Association.

Senator JOHNSON. General Doolittle, I understand that you have a prepared statement and the committee will be delighted to have you proceed in your own way.

STATEMENT OF DR. JAMES H. DOOLITTLE, CHAIRMAN, NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS ACCOMPANIED BY: PAUL G. DEMBLING, NACA LEGAL ADVISER, AND ABE SILVERSTEIN, ASSOCIATE DIRECTOR, NACA LEWIS FLIGHT PROPULSION LABORATORY, CLEVELAND, OHIO

Dr. DOOLITTLE. Mr. Chairman and members of the committee, and counsel, on January 31, 1958, the first of our satellites was put into orbit. The chairman of this committee, the Honorable Lyndon B. Johnson, Senator from Texas, has noted that, and I quote:

> The Explorer is a triumph of persistence against great odds * * *. Our satellite is very aptly named. It is truly an explorer—a representative of the free people searching for the facts of a totally new dimension into which men and women will soon step. And, in its search for facts, it brings us face to face with a sharp reality which we cannot ignore * * *

The previous month, on the 54th anniversary of the historic first flights by Wilbur and Orville Wright, I said:

> There has been exploration since the beginning of mankind, since the beginning of curiosity. The airplane has made well known most of the remote spots on this globe, but exploration will continue. The new exploration will be in science and space. We as a Nation, must have vision and must work hard if we are to be leaders in this new type of exploration * * *. We, the United States of America, can be first. If we do not expend the thought, the effort, and the money required then another and more progressive nation will. They will dominate space, and they will dominate the world. There is a nation with this ambition. We must not let it prevail.

It is with these thoughts in mind that I speak in support of Senate bill 3609, cited as the "National Aeronautics and Space Act of 1958." On April 2, the day the President transmitted to the Congress a special message recommending the establishment of a National Aeronautics and Space Agency, he sent a memorandum of instructions to the Secretary of Defense and to me, as Chairman of the National Advisory Committee for Aeronautics. I should like now to present to this committee a copy of this communication.

(The communication referred to is as follows:)

THE WHITE HOUSE,
Washington, April 2, 1958.

Memorandum for—
The Secretary of Defense
Chairman, the National Advisory Committee for Aeronautics

I have today transmitted to the Congress a special message recommending the establishment of a National Aeronautics and Space Agency. A draft of legislation carrying out this proposal is being transmitted to the Congress by the Director of the Bureau of the Budget.

The new Agency will be based on the present National Advisory Committee for Aeronautics and will continue that agency's well-established programs of aeronautical research. In addition, the new Agency will be responsible for programs concerned with problems of civil space flight, space science, and space technology. The instructions outlined below are concerned with these new activities.

The ultimate potentialities of space flight cannot now be fully grasped. Since some of these potentialities are clearly of significance from the standpoint of our national security, the Department of Defense will have a continuing interest in the programs to be undertaken and will continue to sponsor programs which may be peculiar to or primarily associated with military weapons systems or military operations as well as certain research and development which may be of a general supporting character. Furthermore, I desire that the skills and experience that have been developed within the Department of Defense be fully utilized in support of civil space programs. However, it is appropriate that a civilian agency of the Government take the lead in those activities related to space which extend

beyond the responsibilities customarily considered to be those of a military organization.

I consider it especially felicitous that the National Advisory Committee for Aeronautics will provide the basic organization on which the new Agency will build. Not only does the National Advisory Committee for Aeronautics itself already have a firm understanding of the key problem areas involved and a tested method of approaching such problems, but also this organization and the Department of Defense have long enjoyed a highly productive working relationship. This relationship will ease the period of transition that lies ahead and will provide a basis for the close cooperation that will be needed to solve the difficult problems that will be encountered. It is intended that the new Agency continue to perform for the Department services in support of military aeronautics and missiles programs of the type now performed by the National Advisory Committee for Aeronautics and also provide similar services with respect to military space programs; the Department, in turn, will provide support essential to the success of the new Agency.

In order that necessary work proceed without loss of momentum pending enactment of the proposed legislation, in order that interim measures may be consistent with the intent of this legislation, and in order that implementation of the legislation, when enacted, may be promptly initiated, I desire that the Department of Defense and the National Advisory Committee for Aeronautics take the following actions:

1. The National Advisory Committee for Aeronautics should prepare and present to the appropriate committees of the Congress a full explanation of the proposed legislation and its objectives.

2. The National Advisory Committee for Aeronautics should proceed to formulate such detailed plans as may be required to reorient its present programs, internal organization, and management structure to carry out the functions to be assigned to the National Aeronautics and Space Agency, including the functions now being performed by the National Advisory Committee for Aeronautics, and should also plan and propose such additional actions and programs as may be necessary to implement the proposed legislation. Such actions would include determination of any requirements for additional staff, facilities, or funds that may be needed in the immediate future.

3. The Department of Defense and the National Advisory Committee for Aeronautics should jointly review the pertinent programs currently underway within or planned by the Department, including those authorized by me on March 27, 1958, and should recommend to me as soon as possible which of these programs should be placed under the direction of the new Agency. The Department of Defense and the National Advisory Committee for Aeronautics should also prepare an operating plan to assure adequate arrangements for utilizing in support of the new Agency, either by cooperative arrangements or by transfer to the new Agency, appropriate organizations, facilities, and other functions now within the Department. These actions should be taken in the light of the fact that the proposed legislation contemplates that the new Agency will be given responsibility for all programs except those peculiar to or primarily associated with military weapons systems or military operations. Supporting research and development should be coordinated to provide for the needs of both military and civil programs without unnecessary duplication. It should be noted that Public Law 85–325 authorized the Department of Defense for a period of 1 year to engage in advanced space projects designated by me. The 1-year period will come to a close February 12, 1959. Since the new Agency will absorb the going organization of the National Advisory Committee for Aeronautics, it should be capable of assuming direction of appropriate programs prior to that date.

4. The National Advisory Committee for Aeronautics should discuss with the National Science Foundation and the National Academy of Sciences, as well as other governmental and nongovernmental bodies, the matter of participation of the scientific community on a continuing basis in planning and coordinating the scientific programs for the use of space vehicles in civilian space science. The best scientific judgment available in determining space-science objectives should be utilized. Matters related to dissemination of the data collected should also be considered.

5. The Department of Defense should identify and report to me what programs now appear to be needed in support of well-defined military requirements. It is understood that the Advanced Research Projects Agency will continue to serve as the focal point for such programs within the Department.

Any problems that may arise in carrying out these interim instructions should be discussed with my special assistant for science and technology or with the Bureau of the Budget, as appropriate.

DWIGHT D. EISENHOWER.

Dr. DOOLITTLE. The President's instructions included a preparation and presentation by the NACA to the appropriate committees of the Congress of a full explanation of the proposed NASA legislation and its objectives. I am in complete agreement with the proposed legislation and am, of course, happy to respond to the President's directive. Even if the President had not so instructed, I would have welcomed this opportunity to support the bill.

For the record, I should like to make one further introductory comment. The absence at this hearing today of Dr. Hugh L. Dryden, Director of the NACA, is because, several months ago, the scientific community of free Germany paid him the signal honor of inviting him to deliver, in Munich, the second annual lecture in honor of the late Ludwig Prandtl, the eminent German physicist and aeronautical scientist. The fact that Dr. Dryden was invited to be the first non-German to deliver the Prandtl lecture testifies to the great international reputation that he, so rightly, enjoys. Except for this compelling reason, Dr. Dryden most certainly would be here today.

It was just 50 years ago today—May 6, 1908—that the Wright brothers went back to Kitty Hawk to sharpen their piloting skill before they made the world's first demonstration and sale of a military airplane to the United States. By 1908, the controversy had already begun as to whether the airplane could ever be a militarily decisive weapon. It was not until World War II that the argument was finally settled, beyond all question. In the 30 some years between, the airplane was transformed from a contraption of wood and cloth and wire, driven by unreliable, low-power engines, into all-metal craft that could and did accomplish the military tasks required. The very great improvement in those years and since was due to unceasing research and development effort in which the NACA has played a leading role.

The point I wish to make is that today, so far as space technology is concerned, we are at the early state of development comparable to that of the airplane a half century ago. On the basis of the present state of the art, it may be difficult to see clearly the full range of future civil and military uses of space vehicles. But, already, enough is known for us to be sure that we must lead, not lag, in space technology.

My comments about the uses of satellites and space craft are confined to the nonmilitary aspects. They are only examples of the more obvious uses.

What makes the space vehicle of such tremendous interest to the scientists is the fact that they can use it as a tool to study the universe, including the earth, in a way that previously was completely impossible. We live at the bottom of a deep, atmospheric ocean. As we look skyward through the miles of our atmosphere, even when we use the finest optical and radio telescopes that man has been able to devise, we get only blurred images of the wonders of the heavens. Dr. Joseph Kaplan, Chairman of the United States National Committee for the International Geophysical Year, says that the astronomers

have a lot to put up with: "Looking at the stars through our atmosphere is like looking through a dirty window." And Dr Lloyd V. Berkner, president of Associated Universities, Inc., has pointed out that the difference between radio observations of the heavenly bodies made from earth and from a satellite will be the difference between a picture in black and white and in full color. Stated another way, the atmosphere filters out all but a single octave of light and, similarly, all but a narrow band of the broad spectrum of radio waves that travel earthward from the sun and the distant stars.

If we can furnish the scientists with a steady platform out in space beyond our atmosphere, it will provide priceless opportunities to study the phenomena associated with the physical behavior of the sun and the stars. It is possible, for example, to construct a telescope of useful size, together with the television and transmitting equipment needed to send its observations back to earth, that could be carried in an orbiting satellite that weighs only a ton or so. A first step in developing such a satellite is provision of accurate automatic stabilization and control, a task that admittedly will be difficult. It is, however, a job that is essentially straightforward. It can be accomplished with reasonable promptness if sufficient scientific and technical manpower is assigned to the work.

Your committee, Mr. Chairman, has performed a very real public service by including in your No. 1 compilation of materials on space and astronautics, the basic objectives of a continuing program of scientific research in outer space, as drafted by scientists participating in the International Geophysical Year. This document will enjoy wide readership as a consequence of your action. The many data-gathering projects it proposes should help our citizens to understand the importance of space vehicles for scientific purposes.

In this connection, the question will inevitably and properly arise, what good will all this new information be to the people of the United States? After all, they have to pay the bill, and it is a bill that annually, for years to come, will probably be counted in the hundreds of millions of dollars. I don't know all the good it will do and I doubt if any man alive today can give specific answers. But, in this connection, I am reminded of the story they tell about Michael Faraday, the English physicist, whose pioneering work in electromagnetics had a profound effect upon our later understanding of electrodynamics leading to useful electric power. About a hundred years ago, Mr. Faraday is supposed to have been asked, in the British Parliament, about the value of his electromagnetic experiments. His answer, so the story goes, was, "I can't tell you what it'll be good for. But I'll tell you this: one of these days you'll be taxing it."

I can't tell you precisely what of great value will come out of our moving into space to probe the secrets of the universe. However, I have the conviction, and in this I find myself in the company of some very wise men, that a century from now, perhaps much sooner, people will say that this venturing into space that we're planning now was one of the most practical, intelligent investments of our national wealth to be found in history. If we, in the United States, take the wisely bold action necessary to lead in exploiting the possibilities of space technology for science, all mankind will benefit. If Russia wins dominance in this completely new area, well, I think the consequences are fairly plain—probable Soviet world domination.

Now, fortunately, there are peaceful uses of satellites and space platforms that offer a more immediate payoff. One of the most obvious, and immediately valuable, has to do with meteorology. The weather people calculate that if they can forecast long-range and local weather with greater accuracy, this will, each year, be worth billions of dollars to the citizens of the United States. Over the years, great progress has been made in this direction, but there are still definite limits to what we can hope to accomplish in weather prediction so long as we operate entirely within the earth's atmosphere. For example, the behavior of the air masses over the oceans often determines the weather over the inhabited land masses. These great areas of water, as every schoolboy is taught, cover more than two-thirds of the earth's surface. We know so little about how the world's weather is generated over these vast ocean masses and over the polar areas that we are unable to forecast the resulting weather accurately. This is particularly important in the case of devastating typhoons and tornadoes. We have made some progress in our aerial study of hurricanes that form in the Caribbean, but the cost to expand this kind of effort around the world would be great and the information obtained insufficient.

With properly instrumented satellites, the meteorologists can watch storms form and move and disappear, all around the world on a 24-hour basis. They can also study the physical processes that make our weather, how the earth's surface absorbs heat energy from the sun in varying amounts, and how the heat circulates unevenly between the equatorial and polar regions. By observing, measuring, and then understanding these complicated heat-transfer processes, the meteorologists expect to be able to predict normal and abnormal weather including the onset of destructive droughts, catastrophic windstorms, and flood-producing rains. Beyond all this, they are thinking and planning for the day when, finally, they will have fully comprehended the meaning of their new knowledge and thus be able to control the weather. The worth of such a possibility is literally incalculable.

I am not an electronics expert but the use of satellites in communications also offers great advantages and economies.

Today, we are at the very edge of one of the great frontiers of history. The frontiersmen who explore the vast reaches of this unknown region will be the space scientists. They will undertake their explorations, because they are compelled by the drive that motivates every true scientist to seek new knowledge, valuing it for itself. For us to attempt to gage each of these adventures into space on the basis of the value of its expected immediate results would, I fear, defeat the very purposes of the essential master plan for the peaceful conquest of space.

This thought brings me to where I wish to emphasize as strongly as possible my conviction that the direction of our national space program must be the responsibility of a civilian agency, as stipulated in Senate bill 3609. I speak as a civilian who was for many years privileged to serve in our Armed Forces. I support the Department of Defense position that the military services should be permitted to undertake the projects that have military value. I also support the Department of Defense position that the military services need freedom to conduct research, or to contract for such research, on space matters that may offer promise of future military value. A little

later, I shall touch upon the essentiality of the civilian space program and the military space program being closely coordinated.

Around the world there are signs that, even in Russia, the peoples of this earth are beginning to realize that the new weaponry man has invented cannot be fully used without upsetting our civilization. I wish to be clear on this point. I don't for a moment believe that the millenium has at last arrived. I don't for a moment believe that the Russians have discarded their implacable drive for world domination. But I do believe that the Russians may finally have realized that, in the face of our armed might, any attack they launched against us would result in their receiving mortal wounds. It is quite possible that they have learned, as we have, that all-out nuclear war is no longer a satisfactory way to impose national desires. If so, we may expect Russia to attempt world domination by other means, such as infiltration, insurrection, and limited warfare. Over the long haul they will certainly attempt to achieve world domination through scientific, technological, industrial, and economic preeminence.

This the free world must not permit. We must remain militarily strong and economically strong. Thus we must be able to make whatever military use is desirable and possible in the field of space technology. It means, no less, that we must lead in the development of space technology for peaceful purposes. We and the Russians are competing to capture the minds of the peoples of the world. In this struggle, gaining and retaining world leadership in space science will provide us with tremendous opportunities.

The language of Senate bill 3609 is broad. The authorities it provides are necessary to enable NASA to marshal America's resources as may be needed to carry forward our national space program. The bill provides that the National Advisory Committee for Aeronautics shall become the nucleus of the new agency. What needs to be done in space technology, however, cannot be accomplished merely by expanding the workload of NACA in the space field where it is already focusing nearly half of its research effort. Nor will a mere name change, for purposes of symbolism, be enough. At this point, Mr. Chairman, I offer an organization and distribution chart of the effort related to space research of the National Advisory Committee for Aeronautics for the fiscal year 1958.

The CHAIRMAN. Without objection, the chart will be included in the record at this point.

(The chart referred to faces this page.)

Dr. Doolittle.

For example, the NASA must have authority to contract for a substantial part of its space research to be done by laboratories outside the Government. NACA's research contract authority is limited to $500,000. This is obviously inadequate for the NASA. NASA needs authority to develop, test, launch, and operate aeronautical and space vehicles. NASA needs to have its appropriations on a no-year basis, so that vital space programs can be undertaken and financed without regard to a single fiscal year. NACA does not have that authority, except for construction of laboratory facilities. NASA needs authority to pay salaries that are reasonably comparable with prevailing rates paid non-Federal employees for similar work. As we see it, about half of the work performed by NASA will soon be done by private agencies under contract and about half by the Federal

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HIGH-SPEED FLIGHT STATION
EDWARDS, CALIF.

Staff 312; Plant cost $16,585,000
42E Space Research

NUCLEAR

FREE-FLIGHT RESEARCH
MISSILES, HYPERSONIC
SPACECRAFT:

REENTRY HEATING
MISSILES AND SPACECRA

AERODYNAMIC HEAT

AERODYNAMIC AND
BALLISTIC MISSILES

RADAR REFLECTION
MISSILES AND DECOY

TRANSMISSION OF
FLOWS

LAUNCHING AND ST
HIGH SPECIFIC IM
RESEARCH ROCKETS

BLAST EFFECTS ON

RESEARCH PROGRAMS

FLIGHT RESEARCH ON PROBLEMS OF MANNED SUPERSONIC AND HYPERSONIC AIRCRAFT AND SPACECRAFT:

AERODYNAMIC AND STRUCTURAL HEATING OF FULL-SCALE AIRCRAFT

DYNAMIC STABILITY AND CONTROL AT HIGH SPEEDS AND HIGH ALTITUDES

REACTION CONTROLS AND VEHICLE ORIENTATION AND CONTROL IN SPACE

TRAJECTORIES AND DECELERATIONS DURING ATMOSPHERIC ENTRY

PILOTING AND OTHER HUMAN FACTORS INCLUDING WEIGHTLESS FLIGHT

LANDING OF HIGH-SPEED VEHICLES

FLIGHT SAFETY AND PILOT ESCAPE

PREPARATION FOR MANNED RESEARCH FLIGHTS IN X-15 AIRPLANE

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PRINCIPAL SPACE FACILITIES

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FLIGHT CONTROL SIMULATORS

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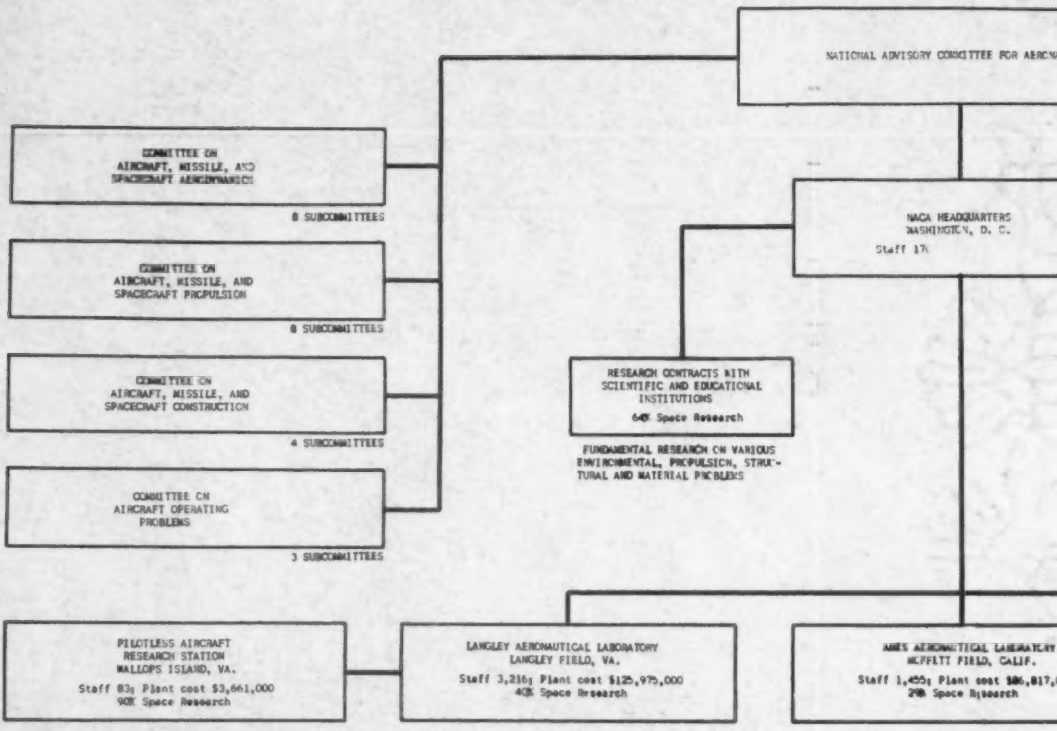
NATIONAL ADVISORY COMMITTE

ORGANIZATION AND DISTRIBUTION OF EFFORT RE

FOR THE FISCAL YEAR


NATIONAL ADVISORY COMMITTEE FOR AERON
COMMITTEE ON AIRCRAFT, MISSILE, AND SPACECRAFT AERODYNAMICS
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COMMITTEE ON AIRCRAFT, MISSILE, AND SPACECRAFT CONSTRUCTION
4 SUBCOMMITTEES
COMMITTEE ON AIRCRAFT OPERATING PROBLEMS
3 SUBCOMMITTEES
NACA HEADQUARTERS WASHINGTON, D. C.
Staff 17
RESEARCH CONTRACTS WITH SCIENTIFIC AND EDUCATIONAL INSTITUTIONS
6% Space Research
FUNDAMENTAL RESEARCH ON VARIOUS ENVIRONMENTAL, PROPULSION, STRUCTURAL AND MATERIAL PROBLEMS
PILOTLESS AIRCRAFT RESEARCH STATION WALLOPS ISLAND, VA.
Staff 83; Plant cost $3,661,000
90% Space Research
LANGLEY AERONAUTICAL LABORATORY LANGLEY FIELD, VA.
Staff 3,216; Plant cost $125,975,000
40% Space Research
AMES AERONAUTICAL LABORATORY MOFFETT FIELD, CALIF.
Staff 1,450; Plant cost $86,817,
2% Space Research

RESEARCH PROGRAMS

FREE-FLIGHT RESEARCH ON PROBLEMS OF BALLISTIC MISSILES, HYPERSONIC AIRCRAFT, SATELLITES, AND SPACECRAFT:

REENTRY HEATING AND STABILITY OF BALLISTIC MISSILES AND SPACECRAFT

AERODYNAMIC HEATING OF HYPERSONIC AIRCRAFT

AERODYNAMIC AND REACTION CONTROLS FOR ANTI-BALLISTIC MISSILES

RADAR REFLECTIONS AND DISCRIMINATION BETWEEN MISSILES AND DECOYS

TRANSMISSION OF RADIO SIGNALS THROUGH IONIZED FLOWS

LAUNCHING AND STAGING OF ROCKETS

HIGH SPECIFIC IMPULSE SOLID-PROPELLANT RESEARCH ROCKETS

BLAST EFFECTS ON FLIGHT VEHICLES

PRINCIPAL SPACE FACILITIES

LAUNCHING SITE AND FIRING RANGE FOR PILOTLESS ROCKET-POWERED MODELS

PROPELLANT JETS

RADAR TRACKING EQUIPMENT

TELEMETERING STATION

RESEARCH PROGRAMS

RESEARCH ON AERODYNAMIC, STRUCTURAL AND OPERATING PROBLEMS OF BALLISTIC MISSILES, HYPERSONIC AIRCRAFT, SATELLITES, AND SPACECRAFT:

HEATING AND HEAT TRANSFER DURING ATMOSPHERIC ENTRY

FUNDAMENTALS OF ATMOSPHERIC GASES AT HIGH TEMPERATURES, AND FLOW OF HOT ELECTRICALLY CONDUCTING GASES IN ELECTRIC AND MAGNETIC FIELDS

HIGH-TEMPERATURE STRUCTURES AND MATERIALS

ABLATION, TRANSPIRATION AND INTERNAL COOLING, AND INSULATION OF REENTRY BODIES

EXTREMELY LIGHTWEIGHT STRUCTURES FOR SATELLITES AND SPACECRAFT

PANEL FLUTTER OF THIN-WALLED STRUCTURES

TRAJECTORIES AND DECELERATIONS DURING ATMOSPHERIC ENTRY

VEHICLE CONFIGURATIONS TO MINIMIZE HEATING AND TO HAVE SATISFACTORY STABILITY AND CONTROL

VEHICLE ORIENTATION AND CONTROL IN SPACE

PILOTING AND HUMAN FACTORS

DYNAMIC INTERACTIONS OF STRUCTURES, SLOSHING ROCKET FUELS, CONTROL SYSTEMS, AND AERODYNAMIC AND INERTIAL LOADS

VIBRATION PROBLEMS ASSOCIATED WITH ENGINE AND AERODYNAMIC NOISE

SPECIFIC VEHICLE PROJECTS, SUCH AS BASE HEATING, HEATING OF PROTUBERANCES, ARMING AND FUZING AND SEPARATION OF STAGES.

PRINCIPAL SPACE FACILITIES

HYPERSONIC WIND TUNNELS

GAS DYNAMICS FACILITIES

ELECTRONIC COMPUTERS

HIGH-TEMPERATURE STRUCTURES AND MATERIALS FACILITIES

FLIGHT CONTROL SIMULATION DEVICES

INFLATABLE SATELLITE VEHICLES

HIGH-TEMPERATURE JETS AND TUNNELS

RESEARCH PROGRAMS

RESEARCH ON PROBLEMS OF BALLISTIC MISSILES, SONIC AIRCRAFT, SATELLITES, AND SPACECRAFT

AERODYNAMIC HEATING DURING ATMOSPHERIC

FLIGHT PATH MECHANICS OF ATMOSPHERIC

VEHICLE CONFIGURATIONS TO ACHIEVE SATISFACTORY STABILITY AND CONTROL AND TO MINIMIZE DRAG AND AERODYNAMIC HEATING

HIGH-TEMPERATURE GAS DYNAMICS

AUTOMATIC FLIGHT CONTROL

INFLUENCE OF AERODYNAMICS ON GUIDANCE

HIGH-VELOCITY IMPACT WITH APPLICATION TO COLLISION OF METEORITES WITH SPACECRAFT AND INTERCEPTION AND DESTRUCTION OF BALLISTIC MISSILES

DYNAMIC LOADS ASSOCIATED WITH "IN LAUNCH" POSITION OF MISSILES

PRINCIPAL SPACE FACILITIES

HYPERVELOCITY BALLISTIC RANGES

ATMOSPHERIC ENTRY SIMULATORS

HYPERSONIC WIND TUNNELS

GAS DYNAMICS FACILITIES

ELECTRONIC COMPUTERS

FLIGHT CONTROL SIMULATORS

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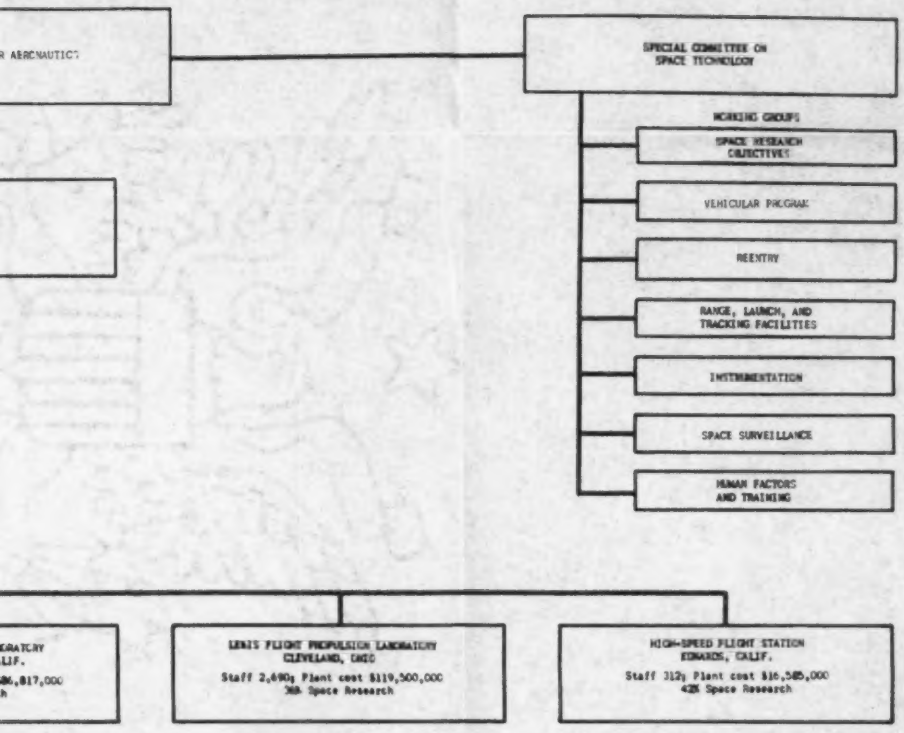

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LEWIS FLIGHT PROPULSION LABORATORY
CLEVELAND, OHIO
Staff 2,690; Plant cost $119,500,000
36% Space Research

RESEARCH PROGRAMS

RESEARCH ON PROPULSION SYSTEMS FOR AIRCRAFT, MISSILES, AND SPACECRAFT

CHEMICAL ROCKET PROPULSION

NUCLEAR ROCKET PROPULSION

ION ROCKET PROPULSION

CENTRAL SYSTEMS FOR CHEMICAL, NUCLEAR, AND IONIC DEVICES

DYNAMICS OF CHEMICAL, NUCLEAR, AND IONIC SYSTEMS

GAS GENERATORS AND TURBOPUMPS FOR CHEMICAL SYSTEMS

MATERIALS FOR USE IN CHEMICAL, NUCLEAR, AND IONIC SYSTEMS

BEARINGS, SEALS, AND LUBRICATION FOR CHEMICAL, NUCLEAR, AND IONIC SYSTEMS

BASIC NOZZLE DESIGN AND PERFORMANCE FOR CHEMICAL AND NUCLEAR SYSTEMS

REGENERATIVE COOLING OF CHEMICAL AND NUCLEAR SYSTEMS

ANALYSIS OF MISSIONS AND VEHICLE PERFORMANCE FOR EACH OF THE POSSIBLE PROPULSION SYSTEMS

PRINCIPAL SPACE FACILITIES

ROCKET LABORATORY

ALTITUDE WIND TUNNEL

SUPERSONIC PROPULSION FACILITY

ELECTRONIC COMPUTING FACILITY

PROPELLANTS CHEMISTRY LABORATORIES FOR HIGH ENERGY PROPELLANTS

MATERIALS RESEARCH LABORATORIES

AIR HANDLING AND EXHAUSTER FACILITY

NUCLEAR REACTOR RESEARCH FACILITIES

HIGH-SPEED FLIGHT STATION
EDWARDS, CALIF.
Staff 312; Plant cost $16,585,000
42% Space Research

RESEARCH PROGRAMS

FLIGHT RESEARCH ON PROBLEMS OF MANNED SUPERSONIC AND HYPERSONIC AIRCRAFT AND SPACECRAFT:

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FLIGHT CONTROL SIMULATORS

employees who make up the NASA organization. It would be extremely difficult, if not impossible, to get and keep on the NASA staff the high caliber people we must have, if they know they can go across the street and do the same kind of work, also for NASA, at higher pay rates. The NACA for the past 12 years, has successfully applied the principle of reasonably competitive pay to 43 percent of its personnel, known as wage-board employees (trades and crafts). This method of establishing rates is thus being extended to the remaining employees.

The bill calls for the new NASA to study problems of manned or unmanned flight within the earth's atmosphere as well as out in space. Continued research on airplanes is important for two reasons. For some time to come, the quality of our overall military posture, our ability to deter enemy aggression, will depend upon our airplanes being able to accomplish their assigned tasks. The rate at which obsolescence occurs in military aviation has never been more rapid than today. It is essential that the NASA assume the vital role NACA now plays in improving the performance of our military aircraft. Similarly, commercial aviation depends to an important degree upon the results of NACA research. This research NASA must also continue to do.

To sum up, the NASA will use the 8,000 scientists and supporting workers of the NACA, and its aerodynamics, structures, and propulsion laboratory facilities, which cost nearly $400 million, as the foundation for the new organization and programs. Then added authorities I have briefly mentioned are essential for it to carry out its new mission—the conduct of our national space program.

One of the questions most often asked about our national space program is how there can be a clear-cut distinction between the space projects which should be under military control and those which should be under NASA. The answer is that on the one side there will be projects clearly and obviously military, and on the other side, projects clearly and obviously civilian. In between, there will be projects with both civilian and military interest. Here, and I expect this will include many projects, there needs to be the closest sort of consultation to determine whether NASA or the Department of Defense (ARPA) should do the work, or whether it should be done cooperatively. For 43 years, NACA has worked most effectively with the military services. I would expect this ability to be carried over into NASA. As a matter of fact, Dr. Dryden—whom I certainly feel is the man in the United States most capable for the job of NASA director—is already working out a good relationship, covering this broad region of mutual interest, with top officials of the Department of Defense. Members of the NACA staff are working closely with ARPA Director Roy W. Johnson and ARPA Chief Scientist Herbert York. The caliber of the men and their desire to get the overall job done in the national interest will, I believe, be even more important in handling this matter than the precise language in the bill. The legislation is, however, necessary in order to provide the framework in which they will operate.

I have spoken about the close relationship required between NASA and the Department of Defense. A similar close, effective relationship must exist between the new agency and the Atomic Energy Commission. This is particularly important in the area of nuclear powerplants. The same can be said respecting the relationship with

the scientific community, largely represented by the National Science Foundation and the National Academy of Sciences.

Finally, I wish to say just a word about the most exciting, and perhaps, ultimately, the most important, aspect of our national program—the putting of man into space. This activity will be conducted as an integral part of NASA's effort, along with research on space technology problems, and development and use of unmanned vehicles to gather desired scientific data. Just as rapidly as research can provide the necessary data, we should employ this information in the development and use of manned vehicles to deepen our penetration into the far distances of our solar system, first to the moon and then on to the planets.

The kind and magnitude of space program that our national interest requires will, as I said earlier, cost hundreds of millions of dollars each year for many years to come. As a nation, we have the scientific and the technical competence that is needed. We have the resources to pay the bill for this new, great exploration. We can and must succeed in finding our destiny in space.

Mr. Chairman, I have taken the liberty of inviting Mr. Dembling, NACA legal adviser, and Mr. Silverstein, Associate Director of the Lewis Flight Propulsion Laboratory.

Mr. Dembling is acquainted with all of the legal aspects of the bill, and Mr. Silverstein is acquainted with technical operation problems of the NACA and has been working with the military in establishment of a liaison with them.

We will be very pleased to endeavor to answer any questions.

Senator JOHNSON. Mr. Dembling and Mr. Silverstein, we welcome you to the committee.

General, may I congratulate you on the excellence of your testimony. Certainly you have brought together briefly and I think concisely the basic information necessary to gain the proper understanding.

This committee is going to have the problem of recommending to the Senate whatever legislation we find necessary as a result of our studies. We are going to need precise information on the organizational problems involved in our Government space effort.

I want to ask each of my colleagues, if they will indulge me, to confine their questions to a period not exceeding 10 minutes on the first go round. Then we will ask members of the staff for any questions they may care to ask; and then we will give each Senator an additional opportunity if he cares to ask any further questions.

DISTINCTION BETWEEN MILITARY AND CIVILIAN PROJECTS

I notice on page 11, General Doolittle, of your statement, you say:

> The answer is that on the one side there will be projects clearly and obviously military, and, on the other side, projects clearly and obviously civilian.

Do you think a line can be drawn—a very clear line—between military and civilian outer space projects?

Dr. DOOLITTLE. Mr. Chairman, I believe that two lines have to be drawn: One on the side of the clearly military projects, such as missiles, reconnaissance satellites, which are obviously military; and another on the line of the strictly civilian projects. In between there is a gray area which has to be settled by conference between the new agency and the military.

I do not believe that one line can be drawn; no, sir.

Senator JOHNSON. General, would you give the committee some examples of the projects which you consider strictly military, the projects which you consider primarily civilian, and the projects which you envision in both areas?

Dr. DOOLITTLE. I would start by saying the most obvious strictly military projects are the long-range missiles and reconnaissance satellites.

I would start at the other end of the spectrum and say that the most obvious civil activities are those dealing with the acquisition of scientific information. This might be lunar probes, vertical probes of various types, or it might be satellites.

A point that I think would lie just within the civil scope would be the development of a 1-million-pound-thrust rocket. The reason is, I see no military use for this immediately and I do see commercial uses for it. Work that might be of interest to both would be work in meteorology where both the civil population and military services would find great value in being able to predict the weather with greater accuracy.

Senator JOHNSON. Under the terms of this bill, General, who will make the decision as to which space projects shall be transferred from the Department of Defense to the new space agency?

Dr. DOOLITTLE. The ultimate decision, sir, would lie in the hands of the President.

My suggestion would be, and this does not require legislation, that the President appoint a committee; on that committee he would have Dr. Killian, his scientific adviser, he would have a senior representative of the Department of Defense, probably the Deputy Secretary, Secretary Quarles; the Director of the NASA, probably Hugh Dryden; the Chairman of the AEC, Admiral Strauss; and the Director of the National Science Foundation, Dr. Alan Waterman.

These people could resolve the questions as to which specific items should be in the NASA, and which specific items should be in the Department of Defense and which should be joint projects.

Senator JOHNSON. I believe you testified before the House committee that a reconnaissance satellite is military.

Dr. DOOLITTLE. Yes, sir.

Senator JOHNSON. And now, I believe the Deputy Secretary of Defense, Mr. Quarles, testified that it was not military.

Can you explain the reason for this difference of opinion?

Dr. DOOLITTLE. I can only say if that is so it is an honest difference of opinion.

Senator JOHNSON. Can you explain or justify your viewpoint as to what is military and what is not?

Dr. DOOLITTLE. One of the most important pieces of information that the military can have is the location of specific targets that they may be obliged to attack, and the activities in the vicinity of those targets. That information could be available through a reconnaissance satellite. It seems to me that this is the most important duty of a reconnaissance satellite and therefore it seems to me that it is a military project.

However, the NASA would be helpful in every possible way in the research necessary to the development of that military satellite, just

as it is presently helpful in every possible way in the research necessary to the development of better fighters and bombers.

Senator JOHNSON. Is not the military now working on a reconnaissance satellite?

Dr. DOOLITTLE. Yes; they have a project and it is going ahead very well, 117–A.

Senator JOHNSON. Is the new space agency to take over the project Vanguard?

Dr. DOOLITTLE. This is one of the points that is now under discussion with the senior people of the NACA, and the senior people of the Defense Department for that project. Whether this will be taken over is not yet decided.

It would seem to me that it is something that should be carried on and if the military chooses to turn it over to the NASA, they are prepared to take it.

Senator JOHNSON. What criteria have been established for determining what is military and what is civilian in outer space?

Dr. DOOLITTLE. The only criteria so far established is the President's bill, and it's interpretation is now being analyzed by the NACA people and the Defense Department people who are working in compliance with the President's directive to the Secretary of the Department of Defense, and to me, a copy of which I offered earlier in my testimony.

If there are any differences of opinion, then these must be resolved at a higher level.

Senator JOHNSON. It is your testimony that the President will determine what is military and what is civilian, and you would have him make that determination based upon a recommendation of a committee such as you outlined?

Dr. DOOLITTLE. Yes.

Senator JOHNSON. How long will this process of trying to divide outer space between the Defense Department and NASA go on? I believe the bill provides 3 years.

Dr. DOOLITTLE. That is not my understanding, sir.

My understanding is that this can be done very promptly, and that certainly it should be done before February 1959, when ARPA goes out of existence.

Senator JOHNSON. In your opinion, do you regard such a division as one which can be made once and for all, or do you think it is going to require a constant reexamination?

Dr. DOOLITTLE. I consider that the division as of today can be made once and for all; but I consider that continually new projects will come up which will have to be decided.

Senator JOHNSON. Now, let us pursue this just a moment. Suppose the Defense Department declares that it has a military requirement for a space vehicle and will not concur in its transfer to NASA. It is your thought that the referee would be a committee that is to be set up from the agencies you listed to make a recommendation, and that the President would make the final determination.

Dr. DOOLITTLE. This would happen occasionally. One point I want to make clear——

Senator JOHNSON. When it does happen, what happens?

Dr. DOOLITTLE. This is the way I envision it happening, but I do not envision it happening frequently enough to be a nuisance to the President.

Senator JOHNSON. But you would envisage a committee set up, with the President making the final determination in the instances where it did happen?

Dr. DOOLITTLE. I would consider that the President would give great powers to this committee, that the committee would solve all except the major problems, within itself, and take only the major ones to the President.

Senator JOHNSON. Now, do you think the President is going to have time to personally review these space projects and the differences of opinion that may come up, even after the committee has made its recommendation?

Dr. DOOLITTLE. The President is very interested in space projects, and I believe he would want to review them.

Senator JOHNSON. I wouldn't want to question his interest, I am just questioning the burden that you may be placing on him and I am trying to get the testimony in the record to determine who is going to do it.

What is your opinion on how much time it is going to take, whether or not you think it is an unnecessary burden or whether you think the ultimate decision is going to be based on this committee, his scientific adviser, or the President himself?

Dr. DOOLITTLE. My understanding of the way this would work would be that the amount of work coming to the President would not be onerous, that he would give his scientific adviser a great deal of authority and the decisions would be largely made in this senior committee made up of the senior people in the five agencies involved.

Senator JOHNSON. Now, if the President is making these decisions, or making them based on recommendations of his scientific adviser, it presents this problem to the Congress, and I do want to get your comment on it:

How can Congress keep track of the developing programs in the whole outer space field if decisions are made by officials who do not testify before congressional committees?

Dr. DOOLITTLE. There is a report to the Congress through the President each year, giving the Agency's past year's activities, and the Congress has a good chance to check on the next year's activities when they approve the budget requests.

PROPOSED CHANGE IN NACA BOARD

Senator JOHNSON. General, why was the present NACA Executive Board, which everyone seems to praise, changed in the proposed bill to an advisory board?

Dr. DOOLITTLE. The reason for the change was because it was believed that action could be more prompt, in that way, and that prompt action is of the greatest importance.

Senator SALTONSTALL. Mr. Chairman, would you repeat that question, please? I didn't understand.

Senator JOHNSON. Why was the present NACA Executive Board, which everyone praised, changed in the proposed bill to an advisory board?

Dr. DOOLITTLE. It is my understanding that the reason was that it was felt that quicker action could be achieved on the overall space program if one man had the authority to make decisions, that is,

the Director, and that he was not held up by the Board, which presently is executive, and in the future will be advisory.

My own personal feeling was that I like the present system better, but I do not believe it is sufficiently important to hold up the legislation.

Senator JOHNSON. What do you think should be the qualifications of the Director of the new Space Agency?

Dr. DOOLITTLE. I believe he should be a man who knows science and technology. I believe he should be a man who is a good organizer, and administrator; I believe he should be a man who understands people and a man who is able to forcefully present his viewpoints in order that he may acquire the money necessary and the support necessary to do his job.

It takes a rather unusual individual to do this job and do it properly.

Senator JOHNSON. Why did you decide upon 17 as the proper number of Board members?

Dr. DOOLITTLE. The present number is 17. We had considered going to 19 because, as you may remember, legislation is pending to put 2 Army people on to balance the 2 Air Force and 2 Navy people presently on the Board. Seventeen is, in my mind, an optimal number because it permits us to have all of the people, the full disciplines involved, that are necessary to assist and advise the Director.

This means that we have now 10 people from Government. However, we have 2 people from the Navy and 2 people from the Air Force. I feel that one is adequate. I would also like to see the Army represented.

I would like to see the AEC represented. I would like to see the National Science Foundation represented.

When this is done, unfortunately we will end up losing 2 very valuable members: 1, the Director of the Bureau of Standards; and the other, the Secretary of the Smithsonian. Even so, I would recommend that we go along with 17.

By the same token, on the civilian side, we have people who are knowledgeable in aerodynamics, structure, propulsion, operations, and we would need someone knowledgeable in electronics and knowledgeable in the human factors, two problems we have not had to date with NACA.

Senator JOHNSON. Why do you think a Director with an Advisory Board is preferable to a Commission such as the Atomic Energy Commission?

Dr. DOOLITTLE. I think he can act more quickly than the five-man Board can act; and I believe it is an economy in the cost of operation and in the rate at which we can proceed.

Senator JOHNSON. Thank you very much, General Doolittle. My time is up and I will have to leave a little early for the Senate floor, so I hope you will excuse me when I do leave.

Senator Wiley, have you any questions?

Senator WILEY. Yes, I have a few.

This is a rather new field, of course, for me, and I want to compliment you, sir.

You mentioned this being an age of exploration, and I imagine the world has never seen the like of it.

DEVELOPMENT OF NEW FORMS OF ENERGY

Now, I would like to know what you expect to find, not only in the field of military value or significance, but what do you expect to find that will lead to utilization possibly of new energies, or new forces to benefit the race, so to speak.

Dr. DOOLITTLE. It is very difficult, Senator Wiley, to say exactly what will be found. Certainly atomic energy will be used as a propulsive force in space flight. Certainly ion propulsion and possibly later photon propulsion. All of these problems are presently being dealt with—in the case of ion propulsion, it is in the study stage; photon propulsion, little is known of, but in the nuclear propulsion there is a program going ahead, as the Atomic Energy people will advise when they testify, and some new propulsion methods certainly will come out of this.

INTERCONTINENTAL MISSILES

Senator WILEY. You mentioned the idea of the satellites in which instruments could be placed or located all around the world in spots. In the case of a global war—does that imply intercontinental missiles?

Dr. DOOLITTLE. That implies immediately intercontinental aircraft, or shorter-range aircraft refuel, and certainly eventually it implies intercontinental missiles. The military is working all out now on their intercontinental missiles. At present they are not available and we have to depend on airplanes and I think that will be so for some little time to come.

DANGEROUS COSMIC RADIATIONS

Senator WILEY. I saw in the paper or a magazine the other day that we had found that at a certain distance above the earth there were very destructive elements in which human beings could not live.

Are you familiar with this fact?

Dr. DOOLITTLE. Yes, sir. Some of the information already obtained from the satellites has indicated that the radiation is greater than we had anticipated, or than had been anticipated; and that it is great enough under certain conditions so that people could not live in an unshielded satellite.

However, it is quite possible to correct this by a small amount of shielding, probably with lead or some other substance which protects against these emanations.

What I mean to say is that this apparently makes manned space flight a little more difficult but it does not prohibit it.

Senator WILEY. It does not prohibit the possibility?

Dr. DOOLITTLE. No, sir.

Senator WILEY. Of penetrating and yet living?

Dr. DOOLITTLE. That is correct.

Senator WILEY. Now, as one who has lived much and explored the meaning of life, it is your conclusion that, as I get it, in the interest of preservation of this Republic, it is absolutely imperative that we go ahead with this program and that we see to it that the Kremlin does not dominate space?

Dr. DOOLITTLE. That is correct.

Senator WILEY. Thank you very much.

That's all the questions I have.

Dr. DOOLITTLE. Thank you very much.

Senator GREEN (acting as chairman). Dr. Doolittle, in the first place let me congratulate you on a very illuminating paper. You make these ideas very clear to the novice.

May I ask one question myself before I proceed to let the other Senators in turn ask their question?

LEADERSHIP, COMPETITION, AND COOPERATION

That is this: You proceed at the very beginning of your address with the idea that if we do not expend the thought, the effort and the money that are required, that another more progressive nation will. They will dominate space and then dominate the world.

How would it be possible for a nation to keep these things a secret?

Dr. DOOLITTLE. Senator Green, I heard everything but the very end of your question. Would you please repeat that?

Senator GREEN. To maintain a monopoly of this knowledge we obtained.

Dr. DOOLITTLE. Senator Green, it is not possible to maintain a monopoly. I do feel that we should maintain leadership.

Senator GREEN. Well, the language then is a little bit misleading, I am afraid, because the implication is that if we do not do it, somebody else will.

Is it just for the advantage, or the credit that we will get, or are there practical advantages?

Dr. DOOLITTLE. What I mean to say, Senator Green, is that if they work harder than we, if they have a better program of space technology than we have, they will get far ahead of us and we cannot immediately catch up with them. It will take a period of time and we should not let them be far ahead of us in anything, certainly not anything that will give them increased world prestige and increased military ability.

Senator GREEN. When we look at the history of the world, we find that there are many occasions where the explorer did not get the advantages of the exploration.

Dr. DOOLITTLE. That is quite right. However, the exploration will give us information and the scientific development will give us information that gives us at least a temporary advantage, from the military point of view.

From the civilian point of view, I certainly hope that space is used for peaceful purposes and that there is a complete interchange of scientific information

Senator GREEN. There is another question related to the first one, and that is this: It seems to be built on the idea that there must be antagonism and competition between these different nations in their discovery of space, in their working out the problems of space.

Does this bill, in your judgment, adequately provide for international cooperation in space exploration?

Dr. DOOLITTLE. For scientific purposes?

Senator GREEN. Yes.

Dr. DOOLITTLE. Yes, sir.

Senator GREEN. It would seem that at the first, from your introduction, there was only expected to be competition for the exclusive advantage of the explorer, but you mean that there should be explora-

tions for knowledge which would be shared with the rest of the world? The assumption seems to be that there will be competition between nations and we must not allow other nations to get ahead of us, and I suppose they feel the same about not letting us get ahead of them.

Dr. DOOLITTLE. That is correct.

Senator GREEN. But would it not be better if there was cooperation between the nations in this exploration which would apply to them, and which cannot be kept secret, if you try, except for a limited time?

Dr. DOOLITTLE. I believe wholeheartedly in cooperation and as soon as it can be achieved, but if there was just people—it takes 2 people to cooperate, it just takes 1 not to cooperate. As soon as we can achieve cooperation, we should go wholeheartedly after it.

Senator GREEN. Your idea is, I assume, that we should encourage cooperation so far as it is possible?

Dr. DOOLITTLE. I would like to see the greatest possible cooperation, but I believe we can cooperate more effectively if we have information and if we are in a good bargaining position.

Senator GREEN. Thank you very much.

Dr. DOOLITTLE. I apologize for not hearing you. I should have brought my hearing aid, which I use most of the time.

Senator GREEN. Senator Bridges, do you have some questions?

Senator BRIDGES. I will pass at this time and I will ask my questions later, if necessary.

Senator GREEN. Senator Hickenlooper?

Senator HICKENLOOPER. I have just 1 or 2 questions, Mr. Chairman.

PRIORITY OF EFFORT

Dr. Doolittle, do you have in mind at the moment a progress chronology as to where we should go from here, from a physical standpoint? I am not certain that I know exactly how to put the question, but should our first efforts be on vehicles such as the Explorer, or should we also combine those efforts with further projects into space than orbiting vessels or vehicles?

Should we at the same time place greater effort on manned space vehicles? Is there a proposed chronology or step-by-step progress which would seem to be indicated now in order to make the greatest possible progress within the capabilities which we envisage?

Dr. DOOLITTLE. Senator Hickenlooper, one of the President's directives was for the NACA to outline a comprehensive program of space technology and space exploration. That program is in process of being worked out now. Certainly the first thing to do is to get scientific information.

The next thing to do is to get as much information of a technological nature as we can; and the last thing to do, after we have solved the really difficult problems, is to put man in space, and probably the order would be: First, vertical probes; next, probes to the vicinity of the moon; and then perhaps a soft landing on the moon with instrumentation; then perhaps at about the same time it will be possible to orbit man; and then a little later it will be possible to send probes to Venus and Mars.

And, with careful instrumentation, go in their vicinity and take a look at them, and send the information back. Then, eventually a

man to the moon; eventually, and again much later, a man to Mars and a man to the vicinity of Venus.

Now, these programs will cover certainly the latter part of this century and just exactly how long it takes to achieve these objectives will be determined by the amount of effort, the excellence of the organization, and the amount of money spent.

Senator HICKENLOOPER. Meanwhile, I take it that you are firmly convinced that we must continue vigorously development of the ion propulsion systems; and also the investigation of the other propulsion systems which we do not know too much about—that is, over and beyond the chemical propulsion systems which we can use at the moment.

Dr. DOOLITTLE. I would say that we should continue rapid development of larger chemical motors, rapid development of nuclear rockets, and continued research, rather than development, on ion propulsion and some basic study of photon propulsion.

Senator HICKENLOOPER. Just one other field, and then I will be through.

LIAISON BETWEEN NEW SPACE AGENCY AND DEPARTMENT OF DEFENSE

I am interested in the separation, or the union, either way, of the civilian and the military aspects of this particular program. I happen to agree thoroughly that civilian control, overall, is the way to handle it; but I also feel that the military aspect must not be put in a position where they can be completely submerged or that they will be deteriorated under perhaps certain imagined or possible civilian attitudes.

Now, I recall discussions which we had at the beginning when the first Atomic Energy Act was being written, and when the question of civilian versus military control was very much in the public eye and in the minds of the Congress. That situation was solved in the Atomic Energy Act after some discussion and satisfactorily, I think, by the creation of a military liaison committee which was a go-between between the civilian control agency and the Defense Department.

I think it has worked very well. I think it has given adequate protection to the national defense portion of atomic energy, and I feel that it has not been permitted to get into a position of overall control of the agency or programs.

Now, do you envision something of that kind that might be established to get this liaison? Is that what you are referring to in this committee that you were talking about?

Dr. DOOLITTLE. I envisaged, Senator Hickenlooper, the continuing liaison that must exist between the Department of Defense and the new agency, and also between the AEC and the new agency, and also between the National Science Foundation and the new agency.

But I do not believe legislation is required to achieve this. On the committee itself, on the board, there should be at least 4 of the 8 spaces, to my mind, occupied by military people; 1 from the Department of Defense, 1 from each of the major military services. There should also be an individual from the Atomic Energy Commission; there should also be someone, the Director of the National Science Foundation, so that at that level there is a liaison each month and on

a high level. It has worked very satisfactorily for the past 43 years with the NACA.

There are major committees and subcommittees. On these working committees, there are members from the services and members from all governmental and industrial agencies interested in the projects.

This liaison goes on continually. In addition to this, I believe there should be a committee, of which I spoke, which would be a decision committee, so that the problems can be promptly resolved. I do not, however, believe that this requires legislation.

Senator HICKENLOOPER. Now, I think one of the strengths of the military liaison committee that presently exists is the fact that by statute it possesses certain authority. It cannot direct the Commission what to do, but it can examine a proposed action or inaction, and if it believes that an action, or an inaction, is inimical to the security of the United States from a military standpoint, it has an appeal system which is given to it by statute, and it can eventually appeal directly, or through the proper channels as set up, directly to the President for final decision. So there is legal authority set up there in the military liaison committee which has seldom been used—I think it may have been used on a couple of occasions, but generally speaking, it has not been necessary to use it, but that authority is there, which is a safeguard.

Dr. DOOLITTLE. We have had 43 years of successful operation with the system that the President recommends. I am satisfied it will continue to work.

Senator HICKENLOOPER. Well, I think that is a very fine record, but I still think it is a field that at least I would like to examine quite carefully to see that there are ample safeguards, not only for safeguarding the civilian management in that operation, but also for safeguarding the national security.

That is all, Mr. Chairman.

I also want to congratulate you on what I believe to be a most helpful and informative statement.

Dr. DOOLITTLE. Thank you, Senator.

Senator GREEN. Senator Anderson, have you some questions?

PREPARATION OF THE BILL—ELIMINATION OF MENTION OF AEC

Senator ANDERSON. General Doolittle, did the NACA prepare a previous draft of this legislation somewhat different from the draft sent by the President?

Dr. DOOLITTLE. It is my understanding, Senator Anderson, that there was a draft prepared in which Dr. Killian's office, the Bureau of the Budget, and the NACA participated. The compromise on all of these is the bill that is before you now.

Senator ANDERSON. And that bill eliminated the reference to the AEC, did it not?

Dr. DOOLITTLE. Beg pardon?

Senator ANDERSON. That was the big change in the compromise, the proposal to allow the AEC to run some of the nuclear propelled projects was taken out by the Bureau of the Budget lawyers; is that correct?

Dr. DOOLITTLE. I am not sure.

Senator ANDERSON. Well, somebody ought to know. Doesn't your lawyer know, or you know, who took out the provision that mentioned the Atomic Energy Commission specifically?

Mr. DEMBLING. I believe, Senator, that the Atomic Energy Commission was cited in the Presidential message, and it was also cited in the directive that the President sent to the Secretary of Defense, and to the Chairman of the NACA. It was later, in the final draft, taken out.

Senator ANDERSON. That's right.

Mr. DEMBLING. And mentioned in connection with other agencies that should be consulted in preparing a program.

Senator ANDERSON. Why was it taken out? Do you remember the argument?

Mr. DEMBLING. I don't know, sir.

Senator ANDERSON. Was it to be sure that those projects didn't get to the Joint Committee on Atomic Energy?

Mr. DEMBLING. I don't know, sir.

Senator ANDERSON. Were you present? Was that statement made while you were there?

Mr. DEMBLING. No, sir.

CONTROL OF THE NEW BOARD

Senator ANDERSON. In setting up this 17-man Board, was there a change made in the character of the Board over what the present Board of the NACA is? In other words, let me ask you the question more directly.

The present Board is composed of a large number of Government officials and a small number of private officials. The President's draft reverses that and puts the private companies in control of the Board, 9 to 8; is that correct?

Dr. DOOLITTLE. Senator, the present Board has 10 people from Government and 7 people from civil life.

Senator ANDERSON. That's right, and the new Board does what?

Dr. DOOLITTLE. The new board would have 8 people from Government and 9 from civil life.

Senator ANDERSON. The answer is "Yes," when I say it is reversing the procedure.

Dr. DOOLITTLE. By a very small margin.

Senator ANDERSON. The Senators won a ball game the other night, 3 to 2, but—they won it. It was a small margin.

I believe at one time last night one team came up with 9 runs in the ninth inning, but the other team finally won by a score of 11 to 10. It was a small margin, but the win is what went into the book.

Now, was there any reason why they decided to let the private companies control this?

Dr. DOOLITTLE. I don't know, but my guess would be—this is strictly my own idea—that they wanted to get more people from the scientific, technical, engineering, and educational areas on the Board.

Senator ANDERSON. They were after the scientific people. Is that why they left off the Smithsonian?

Dr. DOOLITTLE. What is that?

Senator ANDERSON. Is that why they left off the Smithsonian Institution?

Dr. DOOLITTLE. The Smithsonian Institution has not been left off.

Senator ANDERSON. I beg pardon. Is not the Secretary of the Smithsonian on the present Board, but will not be on the proposed Board?

Dr. DOOLITTLE. The Smithsonian is presently on the Board.

Senator ANDERSON. That's right.

Dr. DOOLITTLE. The incoming Board has not yet been completed, but the recommendation——

Senator ANDERSON. Why did they remove the language? Did the Smithsonian have anything to do with the Wright brothers flight at Kitty Hawk?

Dr. DOOLITTLE. Smithsonian has been on the Board and would be very useful on the Board in the future.

Senator ANDERSON. If you don't want to answer about the Wright question, all right.

Did it have anything to do with the Goddard rocket, did it help to finance that?

Dr. DOOLITTLE. It certainly financed work on the Goddard rocket.

Senator ANDERSON. Was not the last Goddard rocket almost identical with the V–2 in size, and in almost every detail of construction?

Dr. DOOLITTLE. I'm not opposed to Smithsonian Institution representation.

Senator ANDERSON. Somebody was opposed to it, were they not?

Dr. DOOLITTLE. No, the Smithsonian has not been ruled off.

Senator ANDERSON. It was on before by specific mention, was it not?

Dr. DOOLITTLE. It was on before, and there is only one governmental agency that is specifically ruled on.

Senator ANDERSON. That is the Department of Defense?

Dr. DOOLITTLE. That is the Department of Defense.

Senator ANDERSON. And your testimony this morning indicated that of the Government people, four would probably be from the Department of Defense?

Dr. DOOLITTLE. Beg pardon?

Senator ANDERSON. Of the 8 Government people, 4 at least would be from the Defense Department?

Dr. DOOLITTLE. That has not been spelled out. It would be my recommendation.

Senator ANDERSON. Yes, and nine from private companies?

Dr. DOOLITTLE. I must point out, Senator Anderson, that the present legislation calls for eight Government people, only one of whom is specified. Those from civil life are to be eminent scientists, engineers, and educators.

Senator ANDERSON. Yes.

Dr. DOOLITTLE. The Smithsonian has not been ruled out.

Senator ANDERSON. No, but I am trying to get to the rather unusual change that is made in the composition where, for the first time, you are going to have an operating agency controlled by private companies with whom there will be dealings.

NO REFERENCE IN BILL TO PATENTS, WEATHER CONTROL, OR THE AEC

Was there any provision made in this legislation with reference to patents?

Mr. DEMBLING. No, sir.

Senator ANDERSON. Was there a long, hard and bitter fight, in your opinion, over the question of patents when the last Atomic Energy Act was adopted? Do you recall?

Dr. DOOLITTLE. I do not recall.

Senator ANDERSON. The very author of that bill, Senator Hickenlooper, would recognize that there was a fight over the patent section, because there was a feeling that somebody ought to protect the public rights on these patents.

Now, this bill is completely silent on that, is it not?

Dr. DOOLITTLE. Yes, it is.

Senator ANDERSON. The question of control of the weather was mentioned. Are you familiar with a Dr. John von Neumann, now deceased, but who was a member of the Atomic Energy Commission?

Dr. DOOLITTLE. I knew him very well.

Senator ANDERSON. Did he have any ideas on weather control?

Dr. DOOLITTLE. He had ideas on weather control, as had Dr. Edward Teller.

Senator ANDERSON. And did not both Dr. Teller and Dr. von Neumann think that nuclear energy or atomic power might be very useful in weather control?

Dr. DOOLITTLE. Yes.

Senator ANDERSON. Yet the Atomic Energy Commission is left out of the bill.

Now, there is a provision by which you could transfer Project Pluto and Project Rover to the space agency, and take it away from the Atomic Energy Commission?

Dr. DOOLITTLE. That could be done, according to the wording of the bill with the concurrence of the head of the AEC.

Senator ANDERSON. Was that the purpose of it?

Dr. DOOLITTLE. No.

Senator ANDERSON. That would get Pluto and Rover away from the Joint Committee on Atomic Energy?

Dr. DOOLITTLE. That certainly was not the specific purpose.

Senator ANDERSON. But it is the definite result?

Dr. DOOLITTLE. Not necessarily. It is a possible result.

NUCLEAR AIRCRAFT

Senator ANDERSON. You recall that the Joint Committee on Atomic Energy took a very strong position on the ANP program, when that was killed in 1953. Was that any part of a recommendation from NACA?

Dr. DOOLITTLE. Not to my knowledge.

Senator ANDERSON. Did anybody from AEC participate in the decision that you know of, to kill the ANP program in 1953?

Dr. DOOLITTLE. I am not acquainted with that particular occasion.

Senator ANDERSON. I hate to be asking you these questions, Dr. Doolittle, because you know that I regard you as one of the most pleasant persons in this country and hope to continue to do so, but were you and Dr. Hugh Dryden half of the team that recommended against early flight in 1958.

Dr. DOOLITTLE. Against what?

Senator ANDERSON. There were four people who recommended against the Navy in its proposal for early nuclear flight, where they

would take an existing airplane and put a nuclear powerplant in it and try to find out what was happening during such a flight.

Dr. DOOLITTLE. I understood you to say in 1953.

Senator ANDERSON. Were you and Dr. Dryden 2 of the people, of the 4, who tried to kill it?

Dr. DOOLITTLE. May we go back to the previous question. I understood you to say in 1953.

Senator ANDERSON. Earlier. I'm now talking about 1958, I believe.

Dr. DOOLITTLE. I was a member of the committee that recommended against going ahead at this time with the Navy and the Air Force accelerated program for nuclear propulsion of aircraft.

Senator ANDERSON. Was Dr. Dryden one more of the participants?

Dr. DOOLITTLE. It was composed of Dr. Dryden, Hans Bethe, Dr. Baker, as chairman, and myself.

Senator ANDERSON. Four members?

Dr. DOOLITTLE. Right.

Senator ANDERSON. Was it too long a question, as to why you didn't want to see early flight?

Dr. DOOLITTLE. How much time do you have, sir?

Senator ANDERSON. Then I will withdraw the question at once.

Dr. DOOLITTLE. Let me explain that this committee did not recommend against going full force into nuclear flight. Their recommendation was to get nuclear flights at the earliest possible moment, but they felt that the thing that was most difficult to do was to get proper materials and to get proper reactors. Consequently, they recommended that the emphasis at this time be on reactors and on materials, in the interest of getting useful nuclear flights at the earliest possible moment.

Now, there has been some misunderstanding. There is some impression that this committee was opposed to nuclear flights, or was an obstructionist committee. That is completely in error.

This committee is anxious to get nuclear flight at the earliest possible moment. They had recommended one way of doing that they sincerely believed was correct.

Senator ANDERSON. Now, you are——

Senator GREEN. Senator Anderson, your time has expired.

Senator ANDERSON. You have a different watch than I have, but go ahead.

Senator GREEN. I'm sorry. There are other Senators who want to have the privilege of asking some questions.

Senator Saltonstall, have you some questions?

Senator SALTONSTALL. Just a very few.

General, on a slightly different line—you can hear me, can you not?

Dr. DOOLITTLE. Yes, sir.

NATIONAL SPACE OBJECTIVES

Senator SALTONSTALL. You have stated that you believe that we should go forward with peaceful purposes and military purposes also.

Dr. DOOLITTLE. Yes.

Senator SALTONSTALL. And do both of those things?

Dr. DOOLITTLE. Yes.

Senator SALTONSTALL. Now, as a practical matter, can the military and peaceful objectives go forward together without really getting into competition for military superiority alone?

Dr. DOOLITTLE. Would you repeat that question, please?

Senator SALTONSTALL. Can the military and peaceful objectives go forward together without, as a practical matter, competition for military superiority alone?

Dr. DOOLITTLE. I see no conflict in the two programs, provided they are properly coordinated.

Senator SALTONSTALL. They can go forward together?

Dr. DOOLITTLE. Yes.

Senator SALTONSTALL. Now, should we, as a nation, after the appropriate committee has given the matter study, state what our objectives are, our national objectives are in space and what are not our national objectives in space?

Dr. DOOLITTLE. I believe that would be very, very desirable, Senator.

Senator SALTONSTALL. In that way we, as a nation, would show, even if we are going forward on some military objectives, that our ultimate objective was a peaceful one?

Dr. DOOLITTLE. Yes, sir.

Senator SALTONSTALL. For scientific purposes?

Dr. DOOLITTLE. Yes, sir, I think that is very important.

INTERNATIONAL COOPERATION

Senator SALTONSTALL. How much, in your opinion, should we go it alone on our space projects and on our space research? Should we try to get in with other nations and if so, to what extent?

Dr. DOOLITTLE. I believe we should coordinate our efforts with other agencies wherever they are willing to coordinate.

Senator SALTONSTALL. With other nations?

Dr. DOOLITTLE. With other nations, yes, sir; and wherever they are not willing to coordinate, I believe we should go it alone. I do not believe we should wait for them, although we should cooperate with them.

Senator SALTONSTALL. In other words, an international agreement on going forward with the space projects, space research would be extremely helpful?

Dr. DOOLITTLE. It would be a very useful thing, yes, sir.

Senator SALTONSTALL. To put it another way, is it, in your opinion, true that competition in space is a reality?

Dr. DOOLITTLE. Yes, sir, it is.

Senator SALTONSTALL. In other words, we, as a nation, can go forward and another nation can go forward and as long as there is no international agreement, we can compete with each other for peaceful purposes as well as military purposes?

Dr. DOOLITTLE. There are two kinds of competition, Senator Saltonstall. One is constructive and one is destructive. I believe in constructive competition, as opposed to destructive competition. If the competition is of such nature as to see which one can make the greatest contribution to the betterment of mankind, I think that, in general, is desirable.

Senator SALTONSTALL. And you believe that if we go forward with military objectives as well as peaceful objectives, that the peaceful objective can be kept always at least on an equal basis, if not on a superior basis?

Dr. DOOLITTLE. Yes, sir.

Senator SALTONSTALL. Let me ask you just one more question.

TYPE OF AGENCY TO BE CREATED

You, of course, are in favor of putting civilian control and of putting this new problem into the Aeronautics Commission of which you are Chairman?

Dr. DOOLITTLE. Yes, sir.

Senator SALTONSTALL. Can you give to us the arguments that might be used from your study of it, of the advantage of creating a new agency, a new civilian agency similar to, we will say, the AEC?

Dr. DOOLITTLE. I would rather give the arguments in favor of putting it in, or using the NACA as the nucleus and, by contrast then say what the agency could not do.

We have 8,000 people and roughly $400 million of facilities which are at the present time being used for both aeronautics and astronautics, almost equally, half and half. The great advantage of utilizing NACA is that you have a going organization, and I think that through using it with the trained personnel and the facilities available, that you can save a great deal of time and a great deal of money.

Senator SALTONSTALL. Now, those are the arguments in favor.

You are a very fair man and a very objective man.

What are the arguments advanced by one like yourself who would stand against it?

Dr. DOOLITTLE. The arguments against it is that you would go slower and it would cost more.

Senator SALTONSTALL. You went so fast on that one that I missed it.

Dr. DOOLITTLE. I think that if a new agency were set up, the arguments against it would be that the rate of progress would be slower and the cost of operations would be greater.

Senator SALTONSTALL. And have we sufficient trained manpower so that we really can create three separate, general purposes here? We have got the Atomic Energy, we have got the Aeronautics Agency and we have got the military, and now which would have space if we create a new agency? It's going to be difficult to get straightened out on that.

Dr. DOOLITTLE. If a new agency were established, there would be serious problems of coordination, cooperation that do not exist if you have the single agency, instead of 2, 1 dealing with aeronautics and 1 with astronautics. I think that this is a much simpler, more straightforward and a better way to do it.

Senator SALTONSTALL. Really, then, it needs a certain amount of combination of problems.

Dr. DOOLITTLE. Both would be interested in structures, both would be interested in aerodynamics, because certainly whatever is used for manned flight will have to leave the earth's surface and return to the earth's surface. They are both interested in propulsion, and you would have an overlap that would be costly and time-consuming.

I think this is by far the better way to do it.

Senator SALTONSTALL. As a former military man, you agree with the proposition that has been stated that it should not in any event be ultimately left in the control of the military?

Dr. DOOLITTLE. The military's prime role is one of defense and offense. I believe that there are questions in the space field with which the military is not particularly interested. Those can certainly be much better done by a civilian agency.

Senator SALTONSTALL. Now, a final statement, rather than a question:

We are all very green on this whole problem, are we not, and we have got to go forward with a point of view that we all have everything to learn. We have to gain by experience. We have got to gain by research. We have got to gain by the information we get, no matter where we get it, and go forward in that spirit. If we are really going to succeed, we have to move in that manner, do we not?

Dr. DOOLITTLE. That is correct, Senator Saltonstall. I would say that in this work we must proceed with an open mind.

Senator SALTONSTALL. And a humble spirit.

Thank you, sir.

Dr. DOOLITTLE. Thank you, Senator.

Senator GREEN. Mr. Symington, do you have some questions?

Senator SYMINGTON. Yes, thank you.

General, people consider you primarily as a military man, or an executive. What year did you receive your doctor of science degree?

Dr. DOOLITTLE. Massachusetts Institute of Technology, 1925.

Senator SYMINGTON. 1925.

Dr. DOOLITTLE. Yes.

Senator SYMINGTON. So, you have been interested in the science of aeronautics 33 years; is that correct?

Dr. DOOLITTLE. Yes, sir. My degree, however, was in engineering. I consider myself an engineer, rather than a scientist.

Senator SYMINGTON. I want to congratulate you on the clarity of your statement.

You, of course, touched on the problem which is in the mind of most of us, how to get as much as possible out of the military department, and at the same time not affect the military requirements.

POSSIBLE PRESIDENTIAL COMMITTEE

You talked about a committee at the Presidential level, some kind of a scientific committee which included Dr. Killian and four other members; is that right?

Dr. DOOLITTLE. Yes, sir.

Senator SYMINGTON. Who would they be?

Dr. DOOLITTLE. This is my own idea, and I would suggest Dr. Killian, Don Quarles, the Deputy Secretary of Defense, Hugh Dryden, the present Director of NACA, and I hope the future Director of the NASA, Admiral Strauss, Chairman of the AEC, and Alan Waterman, the Director of the National Science Foundation. Those are the Government agencies primarily interested.

Senator SYMINGTON. You would let the Department of Defense decide whether they wanted to put on the Secretary of Defense, or the Deputy Secretary, would you not?

Dr. DOOLITTLE. The only reason, Senator Symington, that I suggested Don Quarles is because he has been working very close to this up to the present.

Senator SYMINGTON. You do not want to start a committee off on the basis of personality, you want to start on the basis of position?

Dr. DOOLITTLE. Position and knowledge of the subject.

Senator SYMINGTON. The premise is, if you pick the right position you should pick somebody with a knowledge of the subject.

Dr. DOOLITTLE. My desire is, however, that whoever is put on this is able to make decisions in behalf of the service which he represents, without having to go to anyone else.

Senator SYMINGTON. Now, you said something about the President delegating his authority to the committee, so that the committee would make decisions as to what was military or what was civilian.

You would not want to see that done, would you?

Dr. DOOLITTLE. My thought, Senator Symington, was that this committee would be appointed by the President, the President would, of course, be the final arbiter but on those things which the committee could decide, and decide in compliance with the President's desires, they should so decide in order to bother the President as little as possible.

Senator SYMINGTON. I understand. I am only interested in seeing that things, if possible, get started right and develop into an intelligent management setup, instead of into the mess that we have in many of our agencies at this time.

Now, the National Security Council is only an adviser to the President; he is the final decider. You would not want to see this committee with any more authority than the National Security Council, would you, in that particular field?

Dr. DOOLITTLE. No, sir. I would merely like to see the members of the committee able to speak for their services so that as many decisions could be made at that level as possible.

Senator SYMINGTON. Would you want to have the chairman of the committee with a decisive vote, or would you want to have another Joint Chiefs of Staff arrangement in this new agency?

Dr. DOOLITTLE. I think the chairman should vote; then you have got five.

Senator SYMINGTON. However, a majority vote, is that it?

Dr. DOOLITTLE. I do not consider that there would be many things come to a vote. I think that ninety-some percent of the items brought up would be settled by mutual consent, and when it came to a vote, it might then be necessary to go to the President.

Senator SYMINGTON. Well, you will have the Department of Defense wanting to keep things for its own development, and you will have the Atomic Energy Commission wanting to keep things for its own development. It just occurred to me, if you feel that you would like to see the President delegate some authority, that he could delegate it to a chairman with the rights of decision in this group, and that would be the most logical and businesslike way of doing.

Dr. DOOLITTLE. That would be the logical way. However, the Defense Department would still want the right to go to the President if they were overruled.

Senator SYMINGTON. They would have that, but I was thinking of Dr. Killian, for example. He is on this committee and would be

the direct White House representative of the President; might it not be a good idea to have him as a final authority in case of disagreement on the committee? Everybody is going to fight on that, you know that, you have seen evidence of that already this morning.

Dr. DOOLITTLE. As long as Dr. Killian is in that position, I would be very pleased to see him have final authority.

PROCUREMENT CONTRACTS

Senator SYMINGTON. Now, General, the NACA has been remarkably successful in carrying out its responsibilities with regard to aeronautics, and it has been equally successful in establishing working relationships with civil, military, industrial, educational, and congressional agencies, and it has developed outstanding internal management and internal procedures and particularly its relationships with the committee, which is the board of directors. One thing, however, that some of the people who know the functioning of the NACA almost as well as you do are worried about is that it has had relatively little interest in this question of heavy procurement contracts.

The way the NASA is set up, it would appear that they would be an additional large procurement agency, especially in the research and development field, much larger than the NACA, according to the people who discussed it with me.

What are your comments on that?

Dr. DOOLITTLE. Well, we would have to establish, in the new NASA, the ability to handle contracts of fairly large size, which we do not presently have.

Senator SYMINGTON. The reason I asked that is, I don't think there is anybody who disagrees with the fact that if you consolidate procurement in the Pentagon Building, you would save a lot of money. It was the basis of important recommendations by the Hoover Commission. It has always been my conviction that such consolidation could be accomplished and would save a substantial amount of money. Yet nothing much has ever really been done about it.

Now, in this case, you would be setting up another large Government buyer, and I am impressed with the point that Senator Anderson brought out, that if this Government buyer in turn is controlled by Government sellers, then you might run into some troubles that you had not foreseen. I was just wondering what your thoughts would be on that.

Dr. DOOLITTLE. I do not think that it is particularly important who sets up the organization to spend the money, just so that the money, the necessary amount of money is made available.

Senator SYMINGTON. Well, as I understand the NACA, the committee today is the boss, is that correct?

Dr. DOOLITTLE. That is correct.

Senator SYMINGTON. And in this new arrangement, you would have a director as a boss.

Dr. DOOLITTLE. That is correct.

Senator SYMINGTON. And that Director would have under him or beside him a group of representatives of interested agencies on his Board. Yet, he would be purchasing heavily from private industry, is that correct?

Dr. DOOLITTLE. From research organizations and some from private industry.

Normally, if, for instance, if it were rockets that were desired, he would obtain them through the military services, rather than a contract for them.

CHANGE IN RELATIONSHIP BETWEEN DIRECTOR AND COMMITTEE

Senator SYMINGTON. I don't think there is any man in the country, and I say this with great sincerity, who is as capable to analyze this problem and present it to us as you are. You have seen all three sides of it, and everybody knows the respect and affection the people have for you. I am wondering why you changed from the NACA structure under a committee, and I am not saying it is wrong, to the NASA structure under a single Director.

Dr. DOOLITTLE. My understanding of the reason for change is that it was felt that more rapid action could be taken if there was one man to make decisions and no diffusion of responsibility and authority.

Senator SYMINGTON. But that man then would be subject to a committee decision on the big broad problems?

Dr. DOOLITTLE. It was a committee decision before.

Senator SYMINGTON. You refer to the Killian Committee? The higher committee would like to be the board of directors with control of the directors; is that correct?

Dr. DOOLITTLE. The Killian Committee, as far as I know, has nothing to do with the activities of the NASA. Dr. Killian, himself, would have, in representing the President, a great authority, but the Killian Committee itself is merely an advisory group to Dr. Killian, and, through him, to the President.

Senator SYMINGTON. I am just trying to get the thought. The Killian Committee, therefore, would be a committee primarily set up to decide who worked on what, under the President's direction? In the NASA, the normal position of a board and the position of the present NACA Board would be reversed and that, in effect, the Managing Director would be the boss of the Board of Directors instead of the Board of Directors being the boss of the Managing Director?

Dr. DOOLITTLE. That is correct.

Senator SYMINGTON. Is that correct?

Dr. DOOLITTLE. That is correct.

Senator SYMINGTON. Thank you, Mr. Chairman.

Senator GREEN. Mr. Bricker, have you some questions?

Senator BRICKER. Just one question for clarification.

SCIENTIFIC INFORMATION FROM ARTIFICIAL SATELLITES

General, out of curiosity, the knowledge of the existence of cosmic rays in that outer space, limited outer space, in excess of what you had anticipated, came from what source—satellite or from other research? How did you get the information?

Dr. DOOLITTLE. The information came from a satellite, one of our satellites, and the information came from the fact that they had expected to pick up radiation of a certain strength. They picked up radiations so strong that they jammed the instrumentation. That is where the information came from, but no one knows where the radiation came from, there.

Senator SALTONSTALL. I didn't hear that.

Dr. DOOLITTLE. The radiation jammed the instrumentation.

Senator BRICKER. Did the Russians have that experience, or did they have instrumentation enough or strong enough to reveal the source?

Dr. DOOLITTLE. I don't know.

Senator BRICKER. They have revealed nothing yet?

Dr. DOOLITTLE. Our scientists have not yet been advised as to all the things that the Russians have found in their sputnik, although I believe there was a time period during which they were to do it, and so there has been no violation of their agreement.

Senator BRICKER. That is in the report to the IGY?

Dr. DOOLITTLE. I am not sure.

Senator BRICKER. Have you been able to figure the limitation of that extremely high radioactive area?

Dr. DOOLITTLE. Not yet. Additional experiments with instrumentation that will measure higher intensities will be required before the measurement can be made. That is anticipated as part of the future program.

TYPES OF PROPULSION

Senator BRICKER. You mentioned 3 types of propulsion; 1 nuclear, in which some research is going on, and the other 2 were the ionic, which also has a little bit of research——

Dr. DOOLITTLE. Yes.

Senator BRICKER. What was the third?

Dr. DOOLITTLE. Photon propulsion.

Senator BRICKER. Will you describe that a little bit for the record, if you can?

Dr. DOOLITTLE. I am not enough of a scientist to describe it.

Senator BRICKER. I am not enough to understand, either. It is just curiosity on my part as to the nature of it.

Dr. DOOLITTLE. It is a very advanced form of propulsion through emanations, about which little is presently known.

Senator BRICKER. Not much research in that field going on at the present time?

Dr. DOOLITTLE. Only basic research, trying to find out more basic information. It is not anywhere near ready for development at the present time.

Senator BRICKER. Thank you very much.

Senator GREEN. Does counsel for the committee wish to ask any questions?

Mr. WEISL. I have a few.

DECISIONS ON TRANSFERS TO NEW AGENCY

General Doolittle, you testified that the peculiar civilian areas of exploration by this new Agency, if it is established, would be the million-pound-thrust engine, the vehicles for weather control, methods of communication, space platforms, man-equipped satellites or man-equipped missiles or planes in outer space, and atomic propulsion.

Now, in the testimony before the Senate Preparedness Committee, the various heads of the military testified that they were and are experimenting and conducting research, extensively, into those various fields. They testified that they had civilian organizations, military

organizations, contracts with laboratories, contracts with universities, and coordination with NACA. In addition to that, a new agency was created by the Defense Department, known as ARPA.

Now, how will those various activities be transferred from the military to the new Agency, and who will decide what is to stay there and what is to be transferred?

Dr. DOOLITTLE. Mr. Weisl, at the present time, under the President's directive, people from ARPA, Roy Johnson, Herb York, together with people from the NACA, Mr. Silverstein, Mr. Crowley, some of our senior people are presently making a comprehensive study of all of the work that is being done by ARPA and by other agencies of the Defense Department to see which of that is not of strictly military significance and which should be turned over to the new agency. Already they have come up with almost $100 million worth of functions that should be turned over to the new Agency.

They are now putting it in three baskets: One basket that should immediately be turned over to the new agency; two, the basket that is strictly and agreed, by all, military functions; and the third basket, the basket that is at present undecided, which will be worked on some more and, finally, a decision will have to be made on any items that cannot be agreed between these two agencies.

Mr. WEISL. Who will make that decision?

Dr. DOOLITTLE. That decision will ultimately be made by the President; I would imagine he will give Dr. Killian certain authority to assist.

Mr. WEISL. Well, would not decision making by the President lead—and I am merely asking it for information—to the same trouble that we have had under the present organization of the military, such as the problem of roles and missions for the Army and the problem of which department gets which project? Doesn't that lead to interminable delay, confusion, compromise and struggle for power? Is that not the very thing that we have been complaining about in the present system?

Dr. DOOLITTLE. Mr. Weisl, as long as there are human beings involved in this, there will be honest differences of opinion and, possibly, even some argumentation. But my suggestion, as you remember, was that this Agency, headed by Dr. Killian and with senior representatives of the major agencies involved could, I believe, resolve most of these problems promptly. Then, as new problems came up, they will have to be studied.

Mr. WEISL. Now, as an illustration of the delays, I recall testimony that your Dr. Silverstein, as the head of the Committee, recommended some time ago work on a million-pound-thrust engine or rocket, and nothing was ever done about it and nobody ever resolved it. There have been so many, many illustrations of conflicts that have never been resolved because no one in any particular agency has any authority to make the decision, thus leading to delay.

Dr. DOOLITTLE. Mr. Weisl, it is my honest and sincere belief that the legislation here pending, and the plans to implement it, will solve this problem as far as the space technology is concerned.

It is my understanding also that there is legislation pending for the purpose of solving some of the problems in the military which you have alluded to.

Mr. WEISL. That's all, Senator.

Senator GREEN. The Senator asked for time for additional questions.
Senator ANDERSON. I have 2 or 3 more that I would like to ask.

TYPES OF SHIELDING FOR SPACE VEHICLES

Reference was made to that radioactive band that Dr. Van Allen, of Iowa, I believe has been talking about. Would that radioactive band be not easily passed through by a ship that had been already developed, propelled by nuclear propulsion, in which shielding had already been constructed?

Dr. DOOLITTLE. I will turn that over to Mr. Silverstein.

Mr. SILVERSTEIN. The shielding necessary with a nuclear reactor would be different from the shielding required around a crew compartment.

Senator ANDERSON. What was that?

Mr. SILVERSTEIN. Around the crew compartment.

Senator ANDERSON. Yes?

Mr. SILVERSTEIN. In the nuclear reactor, in space, you do not have any air scattering of the radiation, and you use what is called shadow shielding ahead of the reactor, which is simply a plate at the base of the reactor which takes care of the direct radiations of the reactor to the crew. However, for this electronic radiation we are discussing now, the radiation would be coming in from all sides and would require a different type of shielding.

ROCKET THRUSTS AND WEIGHTS

Senator ANDERSON. Mention was made again about the million-pound thrust. How much would a device have to weigh to get a million-pound thrust up?

Dr. DOOLITTLE. They estimated 700,000 pounds.

Mr. SILVERSTEIN. How much would a rocket have to weigh to get a million pounds?

Senator ANDERSON. Yes. Just the lowest jet stage.

Dr. DOOLITTLE. It depends on how long you want it to stay up.

Mr. SILVERSTEIN. There would be a ratio of the thrust to the weight of the vehicle. It's about 1.4——

Senator ANDERSON. How about a specific impulse, would that have to achieve escape velocity?

Mr. SILVERSTEIN. It depends on the ratio of load carried to the thrust of the rocket.

Senator ANDERSON. You are not just going to take up an empty rocket. Assuming a standard as to what we have, I'll ask it another way: As a specific impulse, do we now have anywhere near enough to take up a rocket with a million-pound thrust?

Mr. SILVERSTEIN. Yes.

Senator ANDERSON. Yes?

Mr. SILVERSTEIN. You could take a load to the moon with a million-pound rocket——

Senator ANDERSON. We have a million-pound thrust?

Mr. SILVERSTEIN. I thought you said "if."

Senator ANDERSON. I am trying to find out what the lift would have to be.

Mr. SILVERSTEIN. The specific impulse?

Senator ANDERSON. Yes.

Mr. SILVERSTEIN. This specific impulse, with the rockets we now have, is around 245 at sea level; that would do it.

Senator ANDERSON. What would nuclear propulsion be—a specific impulse there would start at close to a thousand?

Mr. SILVERSTEIN. Nuclear propulsion could start at about 800.

Senator ANDERSON. That's close to a thousand.

Mr. SILVERSTEIN. In outer space, that might go to a thousand.

Senator ANDERSON. So, it is 4 or 5 times what the devices now have. Would that not simplify the problem a little?

Mr. SILVERSTEIN. In the long-term point of view, I think without question there will be nuclear power in space flight. I think that there is a period now, of from 5 to 10 years of development during which time we most certainly will use chemical propellants.

Senator ANDERSON. I am only interested in trying to say that I do believe we ought to be considering nuclear flights, and there isn't any plan——

Mr. SILVERSTEIN. We are certainly studying it.

Senator ANDERSON. —that gives any encouragement in that field.

INTERNATIONAL COOPERATION

Now, Senator Green asked something about international cooperation. What section of the bill permits international cooperation on space activities?

Dr. DOOLITTLE. There is none.

Senator ANDERSON. That's right, there is none. That's all, Mr. Chairman.

Senator GREEN. Thank you, Dr. Doolittle.

Senator Symington, do you have any further questions to ask?

Senator SYMINGTON. I have no further questions, thank you, Mr. Chairman.

Senator GREEN. Dr. Doolittle, you are anxious to get away, I know. We want to thank you very heartily for your testimony here this morning, not only which related to space matters, but you were able to explain it to us very clearly.

The committee will recess now until 2:30 this afternoon, when it will receive testimony from the Chairman of the Atomic Energy Commission, Adm. Lewis Strauss.

(Whereupon, at 12:30 p. m., the hearing was recessed, until 2:30 p. m., of the same day.)

AFTERNOON SESSION

Senator JOHNSON. The committee will come to order.

Admiral Strauss, will you come to the table, please, and bring with you any of your associates that you desire to have participate in the hearing. Will you please identify them to the committee for the record.

Mr. STRAUSS. Thank you, Mr. Chairman. On my left, is Mr. Olsen, the General Counsel of the Atomic Energy Commission, Gen. Donald Keirn is in charge of the Air Reactors Branch of the Division of Reactor Development of the Commission, and Mr. Bryan Laplante, who is with the Office of Congressional Liaison.

Senator JOHNSON. Our next witness is Admiral Strauss, Chairman of the Atomic Energy Commission.

Admiral Strauss, the committee is looking forward with great interest to the testimony and recommendations you have to make to us.

It is obvious from the preliminary studies that have been done by our staff thus far that many of the plans for future exploration of outer space are based upon the discoveries that have heretofore been made in atomic energy.

As Chairman of this highly important Commission, you are fully qualified to discuss this question and shed light upon many of its ramifications.

As background for your testimony, and without objection, I should like to place a brief biographical sketch of Admiral Strauss in the record at this point. Without objection, it will be included in the record.

(The biographical sketch of Admiral Strauss is as follows:)

BIOGRAPHY OF ADM. LEWIS L. STRAUSS, CHAIRMAN, ATOMIC ENERGY COMMISSION

Mr. Strauss was born in Charleston, W. Va., on January 31, 1896. He was educated in the public schools in Richmond and has received several honorary degrees from a number of universities.

He was secretary to Herbert Hoover, 1917–19, and was associated with Kuhn, Loeb & Co. from 1919–46. He was a member of the Atomic Energy Commission from 1946–50, and has been Chairman of the AEC since 1953. He was a lieutenant commander in the USNR from 1926, advanced to rear admiral 1945.

He has been awarded the Distinguished Service Medal, Legion of Merit, the Gold Star (Navy) and Oak Leaf Cluster.

The CHAIRMAN. Admiral Strauss, will you proceed in your own way to make any comments you desire in connection with the pending legislation or any observations or recommendations in this field that you think would be helpful to the committee, to the Nation, and to the world.

STATEMENT OF ADM. LEWIS L. STRAUSS, CHAIRMAN, ATOMIC ENERGY COMMISSION; ACCOMPANIED BY LARRY OLSEN, GENERAL COUNSEL, AEC; GEN. DONALD KEIRN, IN CHARGE OF THE AIRCRAFT REACTORS BRANCH OF THE AEC, AND BRYAN LaPLANTE, SPECIAL ASSISTANT TO THE GENERAL MANAGER FOR CONGRESSIONAL LIAISON OF THE AEC

Mr. STRAUSS. Thank you, Senator Johnson.

This is the first opportunity that I have ever had to appear before you.

Senator JOHNSON. Admiral, these microphones are for the cameras. They are not loudspeakers, so you will have to speak a little louder. I hope you have been able to hear me.

Mr. STRAUSS. I have heard you clearly, and if I am not making myself heard at the bench, I hope you will let me know.

I am glad to have an opportunity to testify on this important and timely legislation.

I have a very brief statement. It has been prepared only very recently; as a matter of fact it was completed within the hour, and unfortunately I do not have copies. I will attempt to provide them a little later.

Senator JOHNSON. Very well.

Mr. STRAUSS. It would appear, Mr. Chairman, and Senators, that we are rapidly entering what, for want of a better description, is called the space age, and it will one day have an impact on our civilization which we can only speculate upon today.

As has been true in the case of atomic energy it seems inevitable that projected space efforts will open whole new horizons of human activity.

I believe the Atomic Energy Commission is appreciative of the importance of space activities demonstrated by our ROVER and SNAP programs which were initiated long before we had heard of sputniks.

I might explain, since these are code names for convenience, ROVER is the code name of the project under which the Atomic Energy Commission conducts its research and development on nuclear-powered propulsion rockets, and SNAP is the code name under which the Commission conducts similar research for the provision of nuclear power to be used aboard satellites.

If I use these words again, and I believe I do in the statement, ROVER is rockets, and SNAP is nuclear power for satellites.

Our national objective must be bold if the free world is to establish leadership in the conquest of space for peaceful purposes. Because of the newness of the field, effective progress will also require imaginative planning and aggressive execution.

In any forthright and daring endeavor such as this, however, we must expect some disappointments and failures along the way. These failures, of course, are rather more painful and visible in an open democracy than are similar difficulties which one can be reasonably sure also plague those behind the Iron Curtain.

Our goals must be carefully conceived and not permitted to fluctuate in response to emotional pressures engendered by the sporadic success of other nations or the momentary and inevitable occasional failures within our own program.

In view of these factors, it is most important that the legislation which is enacted in this area should provide for an effective and streamlined organization which will facilitate a vigorous national program.

The Commission concurs with the basic concepts expressed in Senate bill 3609 for civilian conduct of the research and development activities concerning civilian application of flight within and beyond the earth's atmosphere.

Equally important, the Atomic Energy Commission strongly supports the concentration in one agency of the overall planning and direction of our national space program.

In the absence of such central direction, we believe that our space activities will lag, our objectives will become confused and uncertain, and result in a costly duplication of efforts. It has been my own belief, and I have so testified, that the selection of the particular agency is perhaps less basic than a clear delineation of responsibility.

Although there are a number of ways in which this central direction might be achieved, it seems to me that Senate bill 3609 accomplishes this purpose effectively.

Although the bill provides for the concentration of overall responsibility which we regard as so essential, it also recognizes the fact

that other agencies, such as the Department of Defense, will continue to play a vital role in space exploration and development.

I am sure that the Atomic Energy Commission will also continue to make important contribution to our space future if the bill is enacted. It seems obvious that the highly specialized talent and experience which exist within the Atomic Energy Commission should not be duplicated by another agency. This is particularly true when one considers the shortage of available scientific manpower in the cross fertilization of ideas which is encouraged in the Commission's laboratories and with considerable success over the years.

Those members of your committee who are also members of the Joint Committee on Atomic Energy, are familiar with our ROVER and SNAP programs.

For the benefit of the other members of this committee, perhaps I might outline so far as possible in an open hearing, the role which atomic energy might reasonably expect to play in space exploration.

Might I point out that the mean distance to the far planets, Pluto, for example, is said to be well over 3 billion miles; 30 plus times as far as we are from the sun. If one assumes straight line travel at an average speed of about 25,000 miles per hour, it would require some 18 years for a one-way trip, a significant portion of man's life span.

On the other hand, the planet Mars, by comparison, is relatively close by. Under the same assumptions, it would require only about 83 days to make a similar trip, and a trip to the moon would require only about a half day.

So until considerable advances in propulsion are possible, it would appear that practical considerations would limit us to the shorter voyages noted above, and in this concept, therefore, I would like to elaborate.

To reach, maneuver, and to explore space within our solar system, at least as far as Mars, one must consider possibly three thresholds of basic propulsion.

One threshold is that of earth escape. Another is that of navigation and maneuver, and the third is that of landing at a destination or back upon the earth.

First, one must leave the earth with its tremendous drag of gravity and air resistance, by means of a booster engine of relatively high thrust; with the further development of space exploration we will have to place more and more mass in orbit. Requirements for the transporting of instrumentation, of men, food, and equipment, will increase with the development of space technology.

Beyond certain payload and range limits, I am told that it may cease to be practical to use chemical propulsion and that nuclear propulsion, with its far greater energy potential, will probably have to be utilized.

I state this, however, as information, and naturally not on the basis of any calculation which I personally am qualified to make. I understand that current atomic reactor concepts, if proven workable, will provide greater performance capability than chemical systems. Yet these reactor concepts "tap" only a small fraction of available fission energy which can be converted to useful work and the potential for future nuclear systems would therefore seem to be large.

In this context, I might note that the energy release of fissioning 1 pound of uranium 235, if it were available, would be equivalent to something in the order of 2 million pounds of chemical fuel.

Once an object is placed in space by means of a high-thrust booster, the second threshold of propulsion must be considered. An object in orbit is free from any appreciable effect of gravity and air resistance, and extremely high thrust for relative movements is then no longer required. This is the area of the possible use of ion propulsion. Here again, nuclear power appears necessary. The thrust which an ionic device can impart may be quite small; yet even small thrust applied over a long period of time in space, free from the appreciable effects of gravity and air resistance, it is believed can impart the extremely high velocities that may be required for navigation.

The large quantities of electric power which are made necessary by the long period of time involved in ionic propulsion suggests the need for nuclear power systems.

The vehicle itself, the first of which would be unmanned in all likelihood, also has demands for electric power to activate its many possible accessories, such as television, recording devices, and other uses, and its capability to transmit this information back to earth must depend upon nuclear systems for power available over long periods of time.

The weights of such systems, then, become extremely important, for every pound of payload in orbit is multiplied many times in the weight of the system required to place it in orbit.

For instance, our staff has calculated that the need of 10 kilowatts of electric power, which is roughly equivalent to the horsepower rating of some of the small three-wheeled sports cars, would require about 15 tons of fuel, plus oxygen, in order for a vehicle to operate in space for only 30 days.

Many other schemes exist to furnish this power such as solar energy. However, they do not appear to our technicians to be as attractive as nuclear power for any reasonable range of power requirement that we can foresee and are not as yet so far developed as even nuclear power is for this purpose.

I spoke, Mr. Chairman, of a possible third threshold of propulsion, and this would be the area of retardation, which would allow survival landings on, say, the moon, or upon return to our earth.

This again could be a chemical system or a nuclear system, depending upon the mission to be performed. In fact, it is quite possible that in some missions, several combinations of nuclear and chemical systems might be employed.

I have reviewed these areas of space propulsion to indicate why the Commission believes that the Nation's space program will draw heavily on nuclear energy and, consequently, why we feel that the Commission will continue to play an indispensable role in our space future.

This, Mr. Chairman, concludes my formal comments on the bill. I would like, in closing, again to say that the Atomic Energy Commission strongly supports its objectives.

Thank you.

QUESTION OF AUTHORITY FOR DIRECTION OF A SPACE PROGRAM

Senator JOHNSON. Thank you for your statement. I believe you testified to the wisdom of giving control and direction and authority to one agency over our space program.

Did you not?

Mr. STRAUSS. I did, Senator.

Senator JOHNSON. You also stated that in your opinion S. 3609 meets that objective?

Mr. STRAUSS. In my opinion, it does, Senator.

Senator JOHNSON. Where, Admiral, in your opinion does this bill vest the central authority? Does it vest it in the Board, or in the Director, or in the Department, or in the President?

Mr. STRAUSS. It seems to me that the authority is vested in the President, Senator, in the sense that he appoints the Director upon the recommendations of the Board, and the Director is responsible to him.

Senator JOHNSON. Now, I observe under "Functions of the Board" that the Board will meet four times and shall advise the Director, and the Board may make recommendations to the President. Over here under "transfer of functions," for a period of 3 years after effective date, the agency shall confer with the head of the department or agency concerned, and, with the approval of the President, may transfer to itself any functions.

It seems to me that this is a pretty involved procedure. We are not going to expect the President to be responsible for each detail of this administration, but, it seems to me, that you vest power in the Director and you say he needs to consult with the Board all right, although he is not bound by them, and he cannot transfer anything without the concurrence of the head of the department or agency concerned, and without the approval of the President.

So it looks like we have authority scattered around in as many places as you have agencies.

Mr. STRAUSS. Senator, my interpretation——

Senator JOHNSON. Is that a wrong assumption?

Mr. STRAUSS. Let me say that my interpretation of that, which may or may not be correct, is, in order that the selection by this Agency of the parts of the activities of other agencies which may be transferred shall be deliberate and not capricious, that they may only be drawn into the ambit of the new Agency as the result of deliberation and the President's initial concurrence.

This is a purely individual, personal, construction. I have not discussed this with Counsel. I don't know what my distinguished Counsel might feel about it.

May I consult him on that point?

Senator JOHNSON. Of course, Admiral.

I want you to get all the advice you have, because the committee will want very much to have your considered recommendations.

The thing that concerns me is, I think you very properly testified as to the wisdom of giving control, direction, and authority to one agency, but I don't find such provisions in the bill that you support. It may be there but it looks to me like you have authority scattered around in as many agencies as you have agencies in this field, and I just wonder on the basis of your broad experience in Government, whether you feel that the Atomic Energy Commission could successfully function under a charter of this kind, where before you could make a step you had to have some agency agree to do it, and/or had to have the approval of the President.

Mr. STRAUSS. This is quite——

Senator JOHNSON. And consult with the Board 3 or 4 times a year, advisory in nature.

Mr. STRAUSS. This is quite different from the Atomic Energy Commission, Senator.

Senator JOHNSON. I realize that, but you have the same problem in administration, and that is what I am pointing out to you. You were asked: Do you have control, direction, and authority vested in one place, and if so, where is it. And your answer is, the President.

Mr. STRAUSS. I believe, as I have read the bill, that this authority is vested in the Director, an individual, and is the same type of authority that in the Atomic Energy Commission is vested in five individuals. If you will recall in 1946 when the Atomic Energy Commission became law, I think on the 31st of July in that year, it provided that on a set date, which I think was December 31, 1946, or January 1, 1947, the properties and the functions of the Manhattan Engineer District of the Corps of Engineers were turned over to the Commission as a unit.

This was a good deal simpler administratively than what faces this agency which will be under the necessity—I should think from reading this—of acquiring some properties and some personnel from more than one existing agency.

The Board has some analogies, but only some, to the General Advisory Committee of the Atomic Energy Commission. It is to be composed of people with recognized backgrounds in the various scientific and engineering fields; it is not in constant session but meets periodically—at quarterly intervals; it has one function that the General Advisory Committee to the Commission does not have and that is, as I read this bill, the Board recommends to the President the person of the Director. In that sense, it is a more responsible body to the President than is the General Advisory Committee to the Commission. The General Advisory Committee to the Commission limits advice to the Commission, and does not, I believe, by statute, advise the President of the United States.

Senator JOHNSON. In your opinion?

Mr. STRAUSS. I am not quite certain as to the accuracy of the last statement, but it is my belief. If I find that I am incorrect, I will offer a correction for the record.

Senator JOHNSON. Admiral, in your opinion is it wise to require the Director to consult with the Board on purely administrative matters?

Mr. STRAUSS. Senator, here I will testify as an individual and not for the Commission because I have never discussed this question with my colleagues.

Senator JOHNSON. You use whatever hat you choose.

Mr. STRAUSS. Thank you, sir, it is the same hat. It is a civilian straw hat.

Senator, I think that a board that meets only at quarterly intervals does not meet sufficiently frequently to be helpful on administrative matters. Administrative problems are of more frequent occurrence and the Director would have to have considerable leeway in order to run an efficient show on his administrative problems.

Senator JOHNSON. I observe here on page 5, the Board shall be consulted by the Director prior to establishment of a major contingent organization and units of the Agency, and assignments of major units and functions thereto.

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Mr. STRAUSS. Senator, I have a print.

Senator JOHNSON. Page 5, line 3, section 5 (c), the Board shall be consulted by the Director prior to—and then I skip to line 11, section 5 (c) (3)—the Board shall be consulted by the Director prior to the establishment of major constituent units of the Agency——

Mr. STRAUSS. I think that is more than a routine administrative decision. That is rather fundamental to the conduct of the affairs of the Agency, and I think it would be the sort of thing that a prudent Director would get the best advice he could on, before taking action and he would therefore consult his Board.

ACCESS TO RESTRICTED DATA

Senator JOHNSON. Thank you, Admiral. What is your opinion of section 7 of the present bill since you have it there, which provides that the AEC may authorize personnel of the new space Agency to have access to restricted data?

Mr. STRAUSS. May I consult counsel on this for a moment, Senator? Senator, the reason for my delay was that I wanted to make sure that the Commission had observed the amenities of discussing with the Bureau of the Budget the answer that I am about to make to your question. In the statement which I read at the opening, I had a paragraph which I did not read and which I should now like to read, which is responsive to your question, I believe, sir.

Senator JOHNSON. Proceed.

Mr. STRAUSS. It seems appropriate to call attention to section 7 of the proposed act which is in effect——

Senator JOHNSON. Admiral, I am having a little difficulty hearing you.

Mr. STRAUSS. I am sorry, sir.

It seems appropriate to call attention to section 7 (a) of the proposed act which is in effect, although not in form, an amendment to the Atomic Energy Act which would place the Space Agency in a status, insofar as access to restricted data is concerned, comparable to that occupied by the Department of Defense under section 143 of the Atomic Energy Act of 1954, as amended. We assume that a primary objective of the proposal is to establish a new mechanism for the exchange of "restricted data" between those agencies having a mutual interest in space problems. If this assumption is correct, then it should be recognized that although section 7 (a) would authorize the Atomic Energy Commission to permit "restricted data" access to an employee of the Space Agency on the basis of that Agency's clearance, it does not alter the existing requirement of the Atomic Energy Act that the same employee could exchange "restricted data" with an employee of the Department of Defense only on the basis of an AEC clearance. This is because section 7 (a) relates only to transmissions of "restricted data" to the proposed space agency.

Now we think that this can be cured. We think that language can be provided that will accomplish what we believe the bill intends, and we would like—if it is the desire of the committee that we should do so—to work with the interested agencies in suggesting an amendment to the language to accomplish the purpose that we believe is intended.

Senator JOHNSON. Thank you, Admiral. If you will submit to the committee suggested clarifying language or amendments to the pro-

posed bill, we will be glad to consider them before we start marking up the measure.

Under the rules of the committee each member is restricted in his first round of questioning to 10 minutes, and the chairman is no exception. My time has expired.

I have some other questions I would like to pursue, later if I am here.

Now, Senator Hickenlooper.

NECESSITY FOR SINGLE COORDINATING AGENCY

Senator HICKENLOOPER. Mr. Chairman, as you know, the Joint Committee on Atomic Energy sometime ago established a special subcommittee on matters of space investigations which might involve atomic energy.

At that time, and since there has been some discussion as to what agency or agencies should have primary jurisdiction or supervision over this particular subject matter, it has been brought out repeatedly, of course, that nuclear propulsion is one of the fields which must be explored and which seems at the moment at least to be an essential field of propulsion for extended exploration into space. However, I have the feeling, and I wonder if you will agree with me, that this whole activity probably is far broader than the field of atomic energy alone. And any agency that is established should have a breed of supervision which would accomplish atomic energy as well as accomplish other scientific and technical and engineering phases of this whole program.

Does that argument hold water, in your opinion?

Mr. STRAUSS. I think it does, Senator. I don't know whether you were present when I testified before. I think it was the House side of a committee which had been formed on the subject within the Joint Committee. If I am not mistaken this was before this bill had been drawn, certainly before it was presented. I have just asked to see whether I have a copy of the testimony here and we do not. At that time I listed those agencies that I thought were possible claimants for this responsibility—the Atomic Energy Commission among them by reason of the work that we were already doing in the field of nuclear propulsion—and I expressed the belief that they could get along together but that it was most important, far more important than the determination which was the best equipped, to see that the responsibility was placed into one agency.

Senator HICKENLOOPER. Thank you. Well, to get at it another way and I think I understand what you mean, but to get at it another way, atomic propulsion in ships is a very important field of course. The Atomic Energy Commission is very vitally interested and properly so, in the atomic components of the propulsion system in ships, but is not in the business of building ships.

Mr. STRAUSS. That is true.

Senator HICKENLOOPER. By the same token, you are not in the business of building airplanes, but you are interested in the atomic components that might go into any atomic power for an airplane.

Mr. STRAUSS. That is true.

Senator HICKENLOOPER. And the same thing would go with power reactors. You are interested in the reactors for the projection of

power, but you are not in the business of building generator stations, that is turbines and things of that sort, and distribution systems.

I have a concept of this matter somewhat along that line and I have used that argument in answer to those people who have suggested in the past that this whole kit and caboodle should be turned over to the Atomic Energy Commission.

I think that idea has been somewhat dispelled as time has gone on, but I feel that there are various agencies which may have a highly specialized interest in one phase of space operation and that probably an overall agency is the best way to handle it rather than attempt to turn it over to a specialized agency which would attempt to get into other fields than its specialty.

Mr. STRAUSS. I would suspect, Senator, that this agency will farm out parts of its problem. A part of that problem has to do with initial thrust and would perhaps be done by those who are engaged in the development of solid and liquid fuels just as our agency is engaged in the development of nuclear propulsion.

Similarly, the vehicle itself, the frame, whether it will be in the course of the years something that resembles a plane or whether it will be something of a totally different configuration, no one can say, but it seems to me that this new agency will place the responsibility for the development of those components in such parts of the Government's establishment as appear to be best qualified to turn them out.

Senator HICKENLOOPER. In other words, I take it from your statement awhile ago when you said there was a vast reservoir of information, technical and skilled information and experience in the agency, that you meant that the Atomic Energy Commission should by all means have direct responsibility for the development of those strictly nuclear matters because of the experience and the background information of the agency.

Mr. STRAUSS. I can best illustrate the validity of that——

Senator HICKENLOOPER. That is rather than have that field taken over by some new agency that had not been in the business.

Mr. STRAUSS. Correct, Senator.

Now take the ROVER project.

The ROVER project is the rocket propulsion project that is being carried on at the Los Alamos Laboratory of the Commission.

The men live there, the laboratories are there, the developmental machine shops and plants are there. To duplicate them would be expensive. To pull those people out would be extremely disruptive. Many of them are engaged not only in that, but in other work as well. The very fact that men are not limited to one project in thinking about it, and in discussing it, is one of the very fortunate things about the laboratories of the Commission. It has kept them on their toes and many of the good ideas which are developed frequently arise in the minds of men not directly concerned with the particular project at hand.

CONSIDERATION OF A MILITARY LIAISON COMMITTEE

Senator HICKENLOOPER. Just one more question. I would like to get your opinion on this. Recalling as you do, of course, the discussions in the formulation of the original legislation on atomic energy about the protection of the national security—that is, the military participation—it involved discussions of civilian control and military

control and all those things, and the device of a military liaison committee was developed

Now I think that was the proposal of the late Senator Vandenburg. A military liaison device was adopted to be sure that the security of the country, from a military standpoint, was not violated in the pursuit of other lines of activity.

Now, is there any device in this bill as you read it, that would have the effect, while retaining complete civilian control over the project, of safeguarding the essential and vital military needs in the whole outer space program?

Mr. STRAUSS. Senator, I think that necessity has been recognized in section 4 (a) (1), which appears on page 3 of the print before me and which provides—and I will read that section:

> No more than eight members of the Board shall be designated from appropriate departments or agencies of the Government of the United States, including at least one who shall be from the Department of Defense.

In the case of the Atomic Energy Commission, as you know, there are 2 members from each of the 3 services on the Military Liaison Committee, and, in addition, there is the Chairman.

Senator HICKENLOOPER. Right.

Mr. STRAUSS. The Military Liaison Committee has been an extremely successful legislative invention. It works in close cooperation with the Atomic Energy Commission, and I have no reason to suppose that this will not be an equally happy arrangement.

Senator HICKENLOOPER. Thank you, Mr. Chairman. I may pursue this a little later. My time has expired.

Senator JOHNSON. If you desire to run over a little bit, it is all right.

Senator HICKENLOOPER. I don't think it is fair.

Senator JOHNSON. Thank you, Senator.

Senator Green?

LACK OF ADEQUATE PROVISIONS FOR INTERNATIONAL COOPERATION

Senator GREEN. Admiral, I want to ask you about the provision, if any, for the cooperation of foreign nations in carrying on these researches.

Mr. STRAUSS. Could you direct me to the section, Senator? I am not letter perfect on this legislation, far from it, and I don't identify myself as being so.

May I have just a moment while my counsel searches for this section?

Senator, I am under the impression—I hope you will correct me if I am wrong—that the provisions of the draft bill that sought to authorize international activities, including exchanges of information, have been deleted. If I am incorrect, I apologize for misinforming you.

Senator GREEN. It has been pointed out to me that there is language in the bill at the bottom of page 2, section 2 (6).

Mr. STRAUSS. Senator, I construe that language, which, in my print, reads: "These activities should be conducted so as to contribute materially to one or more of the following policy objectives," and it lists seven of them, and the sixth one reads:

> Cooperation by the United States with other nations and groups of nations in work done pursuant to this Act and in the peaceful application of the results thereof.

I would assume that that was limited, that that excluded military applications, but I am no lawyer, and, of course, it would not involve a disclosure of Atomic Energy Commission data that is restricted data, and which is specifically protected by the provisions of the Atomic Energy Act.

Senator GREEN. Well, these researches and the results of them would benefit the whole human race, it is hoped. It will affect the whole human race anyway, will it not?

Mr. STRAUSS. We would hope so.

Senator GREEN. Well, if so, shouldn't there be provisions rather detailed as to how that cooperation can be secured?

Mr. STRAUSS. Well, I would assume that the general provision in legislation of this sort would be as specific as one could safely attempt to be at this stage of the act. The history of these new agencies, if the Atomic Energy Commission is a prototype, has been that, in the course of time, the basic law is amended by spelling out in greater detail the extent to which cooperation with other nations may be carried on.

Senator GREEN. The different nations are carrying on their similar investigations, which are very expensive. It will cost the human race a great deal more in the end. We will get the mutual exchange, not only to our advantage, but to theirs. Won't it benefit the human race more than if we try to go it alone?

Mr. STRAUSS. Senator, I would say that, in a world of peace, there would be no question of the fact that your reasoning is unassailable. In a world where peace is uneasy and where this instrumentality, at least to the nontechnical person such as I am, would appear to have both military as well as peaceful applications, that one might proceed with more caution in spelling out, at this juncture, the directive to share information at large. I think that will come, in time.

Senator GREEN. Well, if the different nations proceed each one in his own way, it will be more expensive to them and to the human race and less likely to be effective.

Mr. STRAUSS. I agree that that is true.

Senator GREEN. And should not an effort be made that we all join some great objective, such as this, that benefits the human race on this little planet, rather than to proceed on the assumption that this would be of special advantage to us in our competition with other nations?

Mr. STRAUSS. I certainly think that that is the ultimate goal. Whether it should be the goal of this legislation or not, Senator, I, in my limited judgment, would hesitate to say. I think it is the ideal goal that democracy should share with the world, a world at peace, all of its benefits.

Senator GREEN. Well, if it is ideal, shouldn't some effort be made to attain it through this legislation?

Mr. STRAUSS. Senator, I don't feel competent to express anything other than a personal judgment on that. I would hope that the legislation that will be enacted will state this as an ultimate objective in a world at peace. The world, unfortunately, is not a world at peace. It is not a world at peace at the present time.

Senator GREEN. I won't ask any more questions.

Senator JOHNSON. Thank you, Senator Green.

Admiral Strauss, I observe the lights are giving you a problem with your eyes.

Mr. STRAUSS. No; I am fearful my voice isn't being heard. You say that I am not speaking loudly enough.

Senator JOHNSON. Fine. Thank you very much.

Mr. Saltonstall?

Senator SALTONSTALL. Thank you, Mr. Chairman.

Admiral, may I ask: Are you willing to answer a few questions on the technical language of the act?

Mr. STRAUSS. I will attempt it, Senator, with the assistance of counsel, but, as I stated before you came in, I have given no detailed examination to the technical language of the act, nor am I generally competent to discuss legislation of this character. I am sure that you know, Senator, that this act, this bill, was not drafted by the Atomic Energy Commission.

Senator SALTONSTALL. I understand that.

Mr. STRAUSS. And, with that understanding, I will do my best.

Senator SALTONSTALL. I wanted to follow up a little bit what the chairman had asked. And, perhaps, these are too technical questions, and, if they are, I would like to call them to the attention of our counsel on the committee. It seems to me they should be cleared up.

MEANING OF THE TERMS "AGENCY" AND "DIRECTOR"

This is perhaps the wrong word, but this is called the Space Agency, and yet, under the provisions of the bill, the Agency really becomes the authority of one man, the Director, does it not?

Mr. STRAUSS. Isn't it possible, under law, for an agent to operate his office and he, therefore, becomes an agency? This is a question, Senator, on which I have no technical competence.

Senator SALTONSTALL. I call that to your attention because the words "Director" and "Agency" are used without any interconnection. In one place it is "Agency" and in another it is "Director." It seems to me it should be either all "Agency" or all "Director."

Mr. STRAUSS. I would agree that that would sound more reasonable.

LENGTH OF SERVICE OF BOARD MEMBERS

Senator SALTONSTALL. Now, on page 3, line 20, subsection 4 (a) (1) permits the President to appoint no more than eight members of the board from Government departments or agencies.

I assume as those are members from the Government, they can be appointed by the President or taken away by the President—1 month, 2 months, 3 years, or——

Mr. STRAUSS. I don't know, Senator. I would say some language here to the effect that the appointments should be for terms of 4 years——

Senator SALTONSTALL. That is for appointees from outside the Government under subsection 4 (a) (2).

Mr. STRAUSS. Pardon me?

Senator SALTONSTALL. Those are outside the Government?

Mr. STRAUSS. I beg your pardon—but I'd best say I don't know.

ADVISORY STATUS OF BOARD

Senator SALTONSTALL. Now, following up what the chairman said, I think you said that the Board shall be consulted by the Director prior to certain actions. On page 5—section 5, subsection (c), at the top of page 5, he has apparently to consult the Board, but he doesn't have to take their advice.

Now, would it be good, from your knowledge of the AEC and your experience as a director, would it be desirable when the Director does not follow the advice of the Board to have it put in writing or give some reasons why he doesn't follow their advice?

Mr. STRAUSS. In that case—I can only state the condition in the Atomic Energy Commission—which has not always followed the advice of the General Advisory Committee.

The recommendations there are usually in writing. In fact, it has been the habit of the General Advisory Committee to submit its recommendations in writing, but the Commission has never been required, nor felt it necessary, when it did not follow the advice for reasons that seemed good, to so state in a written opinion.

Sometimes these questions run to trivia. Sometimes they have run to great questions of national policy, as for example, the question of whether or not we should have a thermonuclear weapon, where the General Advisory Committee advised against it, and the Commission, upon the direction of the President, went ahead with it.

I don't know that the establishment of a record would help these situations at all.

Senator SALTONSTALL. It is a little bit difficult in your Commission because you are a Commission. There are only 5 of you and a majority of 3 must agree to act. When the Director disregards the recommendations of the Board here, it is 1 man acting against the advice of at least 9 Board members. It seems to me that there ought to be some provision on that, Mr. Counsel.

PAYMENT OF PERSONNEL AT COMPARABLE RATES

Now, beginning on page 6, line 17, Admiral Strauss, section 6 (b) (2) provides for paying people at rates that are comparable to those paid by non-Federal employers for similar work.

It seems to me that that would throw the level of pay scales for employees in various Government agencies completely out of line.

I don't know if you care to comment on that beyond saying if you think that is necessary.

Mr. STRAUSS. I would like to be excused from commenting on that, Senator. I don't know of any other agency which enjoys this, but it is something which, if the Atomic Energy Commission had, it would, I believe, be very helpful to us.

Therefore, from the point of view of this new agency, in getting it underway in short order, I would endorse that.

Senator SALTONSTALL. Thank you.

ACCEPTANCE OF GIFTS AND PROPERTY BY THE AGENCY

Now, on page 7, line 24, the last line on the page, section 6 (b) (4), I don't recall any other proviso anywhere else whereby a Government agency can accept gifts or donations of services or money.

Assume that the Rockefeller Foundation, say, wished to give a million dollars. Should the Government accept it? Would this give some control over the agency to the foundation? Do you have that in the AEC?

Mr. STRAUSS. We have no authority, so far as I am aware to accept gifts. As a matter of fact, if I might go off the record for a moment, Mr. Chairman——

Senator JOHNSON. I would have you observe the rule.

(Discussion off the record.)

Senator SALTONSTALL. I say personally that I think it might be a troublesome provision. I have just read it.

Mr. STRAUSS. I had not noticed it, as a matter of fact, in my reading of the bill.

TRAINING PROVISION AND SUBSEQUENT OBLIGATION

Senator SALTONSTALL. Now, on page 10, line 24, in section 6 (b) (12), there is a question of policy. If you train a man—and we will say it takes 6 months to train him—under the provisions of this bill he would only have to work 18 months after he came back to work. It seems to me it should be a much longer time. If you train a man for 6 months or a year, it costs you a lot of money, and you are giving him a lot of wisdom he can use elsewhere.

Should he not be required to work at least 6 times the period of his training?

Mr. STRAUSS. I would not like to answer that off the cuff, Senator. I would be glad to supply a written reply for the record if that would be acceptable to you, sir.

Senator SALTONSTALL. Mr. Chairman, I call that to the attention of counsel.

Senator JOHNSON. Would you please supply your written answer for the record at the proper time?

Mr. STRAUSS. I will be glad to do so, sir.

(See statement at end of testimony.)

Senator SALTONSTALL. Mr. Chairman, I have one more.

POSSIBLE TRANSFERS TO NEW AGENCY

On page 15, line 6, Admiral Strauss, section 8, this would permit the Agency—that is, this new Agency—to take over from another agency of Government—we will say the Department of Commerce, for instance, a certain function, if the President approves—take it over and carry it on under the Space Agency.

Now, wouldn't that be better accomplished by leaving it in the Department of Commerce? That is one question.

My second question is, can you do that without working out the appropriations transfer and all that goes with that? Is that a good provision?

Mr. STRAUSS. As I read this, Senator, this can only be done with the approval of the President. In other words, it is not left to the decision of the Director of the Agency.

Senator SALTONSTALL. But the Congress is left out.

Senator JOHNSON. Will the Senator yield?

It requires both the concurrence of the agency, which is not likely to be received in the first place to take something away from them, plus the approval of the President.

Senator SALTONSTALL. That is correct, but it does not require the approval of Congress.

I thank you, Admiral.

CIVILIAN AND MILITARY RESEARCH

Now I have just 2 or 3 general questions I would like to ask you. Do you believe from your experience in the Atomic Energy Commission, that the military and civilian research in this very important problem of space can be carried on together without the military getting the predominant position?

Mr. STRAUSS. Based on the experience with the AEC, I would say that I believe it can, Senator.

Senator SALTONSTALL. Thank you, Admiral. My time is up.

Senator JOHNSON. I want to be sure they didn't charge too much time to the Senator from Massachusetts, who is always courteous to his colleagues——

Senator SALTONSTALL. I thank my colleague. I thought I had 1 more minute.

Senator JOHNSON. Senator, take whatever time is necessary.

Senator SALTONSTALL. I have just one more question.

INTERNATIONAL AGREEMENTS

In your opinion, Admiral, should we go it alone on this space problem, or wouldn't it be better if we work out some international arrangement so that we would have the brains of many countries as well as ours?

Mr. STRAUSS. Well, I think there are two kinds of cooperation that might be possible, Senator. There is first, the cooperation with those countries that are friendly to us, which I think could be fairly comprehensive.

There is cooperation with the entire world, which would include countries that are not friendly to us, and in which I think the degree of this cooperation would be circumscribed by such considerations of prudence as the specific development or discovery might indicate.

I don't think that the rule of thumb could be laid down without more second sight on the developments of the future than I possess.

Senator SALTONSTALL. Thank you, Admiral.

Thank you, Mr. Chairman, and I thank the members of the committee for their courtesy.

Senator JOHNSON. Admiral, if you can answer this briefly, after what Senator Saltonstall said, your attitude on——

Mr. STRAUSS. I am sorry, Senator, I cannot hear you.

QUESTION OF COOPERATION THROUGH THE UNITED NATIONS

Senator JOHNSON. What would be your judgment on exploring such cooperation through the United Nations right now?

Mr. STRAUSS. Senator, the question is out of my competence. I believe it would be an impropriety for me to attempt to answer it.

Senator JOHNSON. Thank you, Admiral.

Mr. Symington?
Senator SYMINGTON. Good afternoon, Admiral.
Mr. STRAUSS. Good afternoon, Senator.

MULTIPLICITY OF AGENCIES INVOLVED IN SPACE EFFORT

Senator SYMINGTON. We have not been able to achieve unification in the Department of Defense because provision was made for interrelated parts of a whole system to be, and I quote, "separately administered."

Now at the beginning of planning our outer space program, we have an opportunity to provide for some unification. S. 3609 does not provide, however, for an overall organization which can plan with foresight for our national and international programs in outer space. Separate agencies are to be separate agencies and are to be separately administered, and voluntary cooperation among coequals is supposed to result in a kind of happy coordination.

There is even no provision for settling questions of jurisdiction among the various executive agencies which will be concerned with the exploration of space.

How many agencies in the executive branch would be concerned with various facets of our outer space programs provided the proposed National Aeronautics and Space Agency is established?

Now it would take time to figure that out; can you supply the information for the record?

Mr. STRAUSS. I can give you an opinion—I can't say how many. I can think of the National Advisory Committee for Aeronautics, the National Science Foundation, the Office of Naval Research, the Atomic Energy Commission, and those parts of the Department of Defense other than the Office of Naval Research which today have an interest in propulsion, rocket propulsion and instrumentation, of which there must be a substantial number. Before you came in, I believe, I expressed the feeling that more important than the selection of any particular agency for this responsibility was the necessity for locating the responsibility in an agency—one agency.

Senator SYMINGTON. Well, now, you mean that you would give this agency complete authority over work that was being done, for example, space work in the Atomic Energy Commission?

Mr. STRAUSS. Not authority, sir, but responsibility.

They might ask the Atomic Energy Commission, let us say, to design and develop and produce a piece of equipment, a rocket motor of a certain size and a certain weight and a certain thrust, designed to exist for a certain period of time and operate under a certain temperature and so forth. But those arrangements would be made with the agencies which had the organization and the laboratories and the equipment just as today when a Government department places an order with a company to produce a plane or an engine; it doesn't take over the plant. This is the way I conceive of it.

Senator SYMINGTON. In your experience in business and government, which has been extensive in both cases, do you know of any broad setup where you have allocated responsibility without some authority?

Mr. STRAUSS. There is authority here since the authority would be the provision of the funds.

I assume that all outer space activities will be budgeted under the appropriation for this agency.

Senator SYMINGTON. I would like to pursue that further some time with you.

Mr. STRAUSS. That is an assumption, Senator; I don't believe it is mentioned.

It is not specified I am told in the act, but obviously it would be the business way of doing it, sir.

Senator SYMINGTON. I know. I can think of several more agencies that would be involved in this situation. At your convenience would you supply all the agencies which you and your staff figure would be involved in this new law?

Mr. STRAUSS. I would be glad to try it.

Senator SYMINGTON. Thank you.

(See statement at end of testimony.)

Mr. STRAUSS. I don't know how comprehensive it will be.

JURISDICTION OF NUCLEAR PROJECTS

Senator SYMINGTON. If legislation were needed for a nuclear rocket where would it originate?

Mr. STRAUSS. The legislation for nuclear rockets—that is to say the authorization—precedes the appropriation for such a device and would originate with the Joint Committee on Atomic Energy on a proposal of the Commission after clearance with the Bureau of the Budget, under the present circumstances.

Senator SYMINGTON. Well now, you are designed for civilian control, first last and always, but you realize in your answer that you haven't included the Department of Defense which might be interested in a nuclear rocket.

Mr. STRAUSS. Well, the Department of Defense would not be in ignorance of what is projected because of the existence of the Military Liaison Committee in the case of the Atomic Energy Commission. Under this bill at least one from the Department of Defense would be on the National Aeronautics and Space Board and would provide the Defense Department with information about such a project.

Senator SYMINGTON. I know, but I think there is a little difference between a nuclear rocket and, for example, a hydrogen bomb. One is a weapon and the other is a weapon system. If there is no presentation of the position of the military in the development of a weapon system, where are they left as you go farther into the nuclear field?

Mr. STRAUSS. Well, the Military Liaison Committee to the Atomic Energy Commission does not limit its interest entirely to weapons.

On the contrary, they are very much concerned with nuclear propulsion of submarines. They are concerned with nuclear propulsion of airplanes, the nuclear propulsion of rockets, and I have with me, seated here and I would like to introduce him to you Senator Symington, General Keirn who is in particular charge of our development work on the production of nuclear motors for rockets, ram jets, and other aviation uses.

Senator SYMINGTON. Thank you, Admiral. I understand that, having had extensive experience with military liaison committees myself.

Mr. STRAUSS. I knew that.

Mr. SYMINGTON. The Military Liaison Committee is greatly interested in what the Atomic Energy Commission does, somewhat in the same way as if we owned some stock in United States Steel, we would be greatly interested in what United States Steel does. But, where is there any authority regarding the nuclear rocket which the Defense Department decides they want? What agency for example, is going to be the agency? Will it be the Department of Defense, the new NASA, the Atomic Energy Commission, or the Bureau of the Budget which would originate that project, and have a deciding voice in what was going to happen about it?

Mr. STRAUSS. Counsel calls my attention to language in section 2 in the proposed act on page 2, beginning on line 4, which reads:

> The Congress further declares that such activity should be directed by a civilian agency exercising control over aeronautical and space research sponsored by the United States, except insofar as such activities may be peculiar to or primarily associated with weapon systems or military operations, in which case the agency may act in cooperation with, or on behalf of, the Department of Defense.

Now, of course, all of this in any language presupposes an attempt on the part of the two agencies to cooperate and if the experience of the Atomic Energy Commission and the Department of Defense may be taken as a model, they will cooperate, and I believe that testimony from past members of the Military Liaison Committee, many of whom have gone into honorable retirement or into positions of great trust and responsibility in industry will bear out my contention that the working arrangement between the two agencies has been extraordinarily good.

I started to say superb, but I would like to leave it as it is.

Senator SYMINGTON. Mr. Chairman, I have some further questions, but if my time is up, I will yield.

Senator JOHNSON. Senator Bricker.

USES OF NUCLEAR POWER IN SPACE VEHICLES

Senator BRICKER. I have just a couple of questions, Mr. Chairman. What are the peaceful uses in this field concerned with; and would propulsion be the only phase of it the AEC would be interested in?

Mr. STRAUSS. And the other which I mentioned, Senator, the provision of a power source of long range, long life, low weight, no oxygen consumption on a satellite or space vehicle to provide the additional propulsion required for navigation and to power the devices and the machinery and other instrumentation that would be on the vehicle itself.

Senator BRICKER. And get it back.

Mr. STRAUSS. Pardon me?

Senator BRICKER. And to get it back.

Mr. STRAUSS. And get it back. There may very well be in the course of development other uses that I had not thought of which may be far more important than any of those I have mentioned. These are the ones which we speak of today.

Senator BRICKER. Of course, in the military aspects of it, it would be of far wider interest, but I didn't want to ask about that.

AEC REPORTS TO THE JOINT COMMITTEE ON ATOMIC ENERGY

Do you think this bill would change in any way in this field of space propulsion the relation of the Atomic Energy Commission with the Joint Committee as far as keeping it currently advised is concerned?

Mr. STRAUSS. We regard the requirement to keep the Joint Committee fully and currently informed as overriding. It is a paramount responsibility that we have.

I do not see anything in this bill that in any way limits that responsibility.

Senator BRICKER. And it will cover anything that it had done in the space field?

Mr. STRAUSS. Counsel assures me that my interpretation of it is correct.

Senator BRICKER. I thank you.

Mr. Chairman, that is all.

Senator JOHNSON. Thank you, Senator Bricker.

Mr. Counsel?

QUESTION OF JURISDICTION OF SPACE PROJECTS

Mr. WEISL. Mr. Strauss, in looking over the functions of this agency it appears that each of those functions are now being performed by each department in the military service. In other words, the research and development sections of the Navy, the Army, and the Air Force are all performing these functions. And the bill provides that Congress declare its policy to be that activities by this agency concerning outer space should be controlled by this agency except insofar as these activities may be peculiar or primarily associated with weapons, systems, or military operations.

Now, we had the testimony of General Doolittle that a reconnaissance satellite, was a military operation. We had the testimony before the House committee of Secretary Quarles that a reconnaissance satellite was not a military operation. We had the testimony of General Schriever before the House committee that over 90 percent of everything connected with outer space has a military function or is concerned with military operations.

Now, how can this Director or this Agency exercise responsibility with no authority to decide what is and what is not a military or what is or is not a civilian function? What standards are there? Who is to decide this? How can a committee that is advising the Director and a Director who has no power to decide have any responsibility if he hasn't got the authority that ought to go with the responsibility?

Now, it is true that you can go to the President, but hasn't that been the difficulty of the Defense Department? Isn't that what the President is complaining about before the House committee when he says that there is such a division of opinion among the various branches of the military and the various advisory committees and the various advisers to the advisers, with no authority by the Secretary of Defense to decide it?

Senator JOHNSON. Senator Symington, would you preside, please?

Mr. WEISL. I merely posed that question.

Mr. STRAUSS. It is a difficult question.

Mr. WEISL. This points out what you say is true. It is wonderful to have responsibility in an agency or a director, but if that director or agency doesn't have the authority to go with the responsibility, the responsibility doesn't do very much good.

Mr. STRAUSS. Mr. Weisl, the answer may be in this document. Not having drafted it, I did not put it in there, and I don't know where to find it, but I am satisfied that this must have been an issue in the minds of the draftsmen, whoever they may be, and that I can, upon inquiry, ascertain it, ascertain their views as to the answer and provide you with it, but it never occurred to me that I would be asked to testify on those aspects of the bill, that do not concern the Atomic Energy Commission.

Mr. WEISL. It is probably unfair——

Mr. STRAUSS. And I do not know the answer to your question.

Mr. WEISL. It is probably unfair to ask you.

Mr. STRAUSS. No.

Mr. WEISL. But I merely asked you to point up the possible deficiency in this bill and also to point out that unless you have authority to go along with the responsibility, the responsibility is meaningless.

Mr. STRAUSS. Well, it seems to me that the very genesis of the bill was stimulated by the issues which you have recited, and that, therefore, the answer to it is somewhere in the language here.

Mr. WEISL. It is true, as you point out, that the Atomic Energy Commission has had no difficulty in cooperating with the Defense Department. But fortunately for the Atomic Energy Commission, the Defense Department had no part in developing the atom bomb, that is, they had some small part but they didn't perform any functions of the Atomic Energy Commission.

Mr. STRAUSS. Mr. Weisl, historically there would have been no atomic bomb without the Defense Department. The Corps of Engineers—it is incumbent upon me to say at this point for the record that the Corps of Engineers developed the atomic bomb in the sense that they built the plants and built the laboratories and put the steam behind it that got the job done. And as keen as I am for civilian control, and I testified for it in 1946, we would not have had the weapon today and we would not have many of the important executives that we have today had we not been able to persuade men to get out of uniform, give up their careers, and come to work as civilians for the Atomic Energy Commission. I must say that.

Mr. WEISL. Now, thank you, Admiral.

INTERNATIONAL REGULATION OF OUTER SPACE

Another problem that I would like to raise is this. Under the present system of international law, the air above a country or a nation belongs to that nation and they have a right under the existing law to shoot down any vehicle or any satellite or any plane that passes through that part of the air over the nation.

Now, do you think, or have you any suggestion as to how some system could be devised so that some sane international law could be developed to regulate outer space as the oceans and the seas are now regulated?

Mr. STRAUSS. Well, with great humility, Mr. Weisl, I would say in my opinion this is a piece of business to be on the agenda of the United Nations. I would not know any other way of approaching it except by some international convention.

Obviously the control of a nation cannot extend indefinitely into outer space without very shortly reaching dimensions which would be impossible for it to patrol in any event.

Mr. WEISL. It has been pointed out that there is great danger when you are dealing with an unreliable nation that they may see fit to shoot down a satellite or shoot down a space vehicle that we might put up, and in that way perhaps precipitate a possible world conflict, and therefore it is urgent that immediate steps be taken to regulate outer space so that such an incident could not happen.

Mr. STRAUSS. I would suggest that the deliberate destruction of a space satellite by a missile presented a problem of inordinate difficulty, perhaps hundreds of times greater than that of putting the target itself into orbit. I believe, therefore, it is a problem that, while it must be faced, the whole issue of the control of outer space will by peaceful means long since have been solved, Mr. Weisl. That is an expression of personal opinion.

Mr. WEISL. Those are all the questions I have.

Senator SYMINGTON. Senator Hickenlooper?

Senator HICKENLOOPER. No.

QUESTION OF LEGISLATIVE COMMITTEE JURISDICTION

Senator SYMINGTON. Admiral, I don't want to pursue too far this important point of locating authority and responsibility together, but I hope this time we can get off to the right start. Back in fiscal 1950 when the budget in the military was less than $14 billion, it was like throwing a piece of meat into an arena and letting 300 hungry tigers go in after it. Then, when the Korean war started, everybody could get everything he wanted. The various services began scratching each others' backs and within a very short time the budget was about $60 billion instead of about $14 billion.

Now, for example, if a bill on nuclear rockets came to the Congress, where do you think that bill should be referred? Should it be referred to the Joint Committee on Atomic Energy or the new Space Committee, or the Armed Services Committee? What is your personal opinion as to the committee that should handle it?

Mr. STRAUSS. My personal opinion—and I would certainly want to emphasize the word "personal" here, Senator—would be that the bill would go to that committee whose component represented the larger part of the expense. That is to say, if this were a bill for X dollars and 90 percent of X represented nuclear propulsion, I would think that it would go to the Joint Committee on Atomic Energy.

If, on the other hand, it were a bill to produce 10,000 rockets of an approved design, in other words, just as if you were buying 10,000 destroyers or 10,000 planes, the development having already been done, I think a case could be made here for the Armed Services Committee.

But this is not the testimony of the Atomic Energy Commission. The question has never arisen in any consideration I have had with my associates.

Senator SYMINGTON. You understand the question that counsel asked you about the power of decision in the new committee—the committee is the lower story from the standpoint of getting the job done in the interest of the taxpayer. If outer space is chopped up into too many pieces in the executive, would it not result in separate considerations by several different appropriations subcommittees?

Mr. STRAUSS. I would think that one budget would very greatly simplify this matter. There would be instances where I could see justification for certain items being budgeted otherwise, but I think as I said to you earlier, one way of having authority accompany responsibility would be to have the funds accompany responsibility since the funds carry authority with them.

RELATING SCIENTIFIC PROJECTS TO NATIONAL SECURITY POLICY

Senator SYMINGTON. Now, we failed before in not relating our scientific Vanguard to our national security policy. Is there any provision you can see in S. 3609 which would prevent a repetition of this failure in the future?

Mr. STRAUSS. I haven't studied the act with any familiarity with the situation you mentioned, Senator, and therefore, have no opinion on that point.

DEPARTMENT OF STATE NOT MENTIONED IN BILL

Senator SYMINGTON. I notice that, in the declaration of policy, point 6 refers to nations and groups of nations, but there is no implementation. All subsequent references are to individuals or to the scientific community.

Mr. STRAUSS. I said a little while ago—I don't know whether you were in the room at the time—but I thought that that was a general expression of intent and that perhaps in amending legislation or in regulations at a subsequent date, this would be spelled out in greater detail.

Senator SYMINGTON. Where does the Department of State come into the picture?

Mr. STRAUSS. My counsel tells me that he does not recall any mention of the Department of State here, but on the other hand, there is a coordination, of course, at the Presidential level with the Department of State on the part of all agencies of the Government.

MERITS OF SINGLE ADMINISTRATOR OR COMMISSION

Senator SYMINGTON. Now, you operate with a Commission of which you are the Chairman, but you operate on a commission basis; do you not?

Mr. STRAUSS. That is correct. I preside, but I have one vote and the Commissioners have equal vote.

Senator SYMINGTON. Do you prefer operating the way you do now, or would you like to see your Commission abolished and have an Administrator instead of the Board?

Mr. STRAUSS. Senator, I have no hesitation in answering that to say it would be vastly more convenient to operate as a single indi-

vidual, and nothing like as good for the country, since I think that debate and difference of ideas have been beneficial to the Commission.

Senator SYMINGTON. Then why do you think almost the first step in taking the NACA into space is to abolish the Commission from the standpoint of authority and create a single Administrator?

Mr. STRAUSS. I don't think that it does that, Senator. Besides, there are many philosophies about how Government agencies can be conducted. In this particular case the fact that eight members of the Board are going to represent agencies of the Government seems to me to provide the Director with individuals at hand here in Washington who will be his advisers.

Senator SYMINGTON. Well, I must take exception on the basis of General Doolittle's testimony only. You do know more than I do about it, I am sure, but General Doolittle testified in no uncertain terms this morning that the Commission would be advisory and the boss would be the Managing Director, the Executive Director. He also testified that as the NACA is set up today, it is set up the way your Agency is set up, that the Commission is the boss and the Executive Director works for the Commission. In a new NASA situation, the Commission or Board is simply advisory to the managing Director or the Executive Director, and I am very interested to get your testimony that you think it is better for the country that the Atomic Energy Commission operate the way it is set up. But at the same time, it surprises me that there is this switch because——

Mr. STRAUSS. I should qualify——

Senator SYMINGTON. —your agency would seem to be as close to the NACA or the NASA in the general approach to the problem of new technology and science as any other agency in the Government.

Mr. STRAUSS. Well, except for this, Senator. The Atomic Energy Commission affected the lives and the welfare of the people of the United States and the world to a far more critical and intimate degree than I can see is likely to derive from this Agency, as important as it is. And while the necessity for deliberation and for some degree of unanimity, at least for majority decision, takes time and is wearing, I believe that in the case of an agency like the Atomic Energy Commission, which necessitates so large a degree of exposure to the public, that the Commission form was best.

I came into a good deal of, I might say, unjustified and unwarranted criticism because of an amendment that was proposed to the Atomic Energy Act in 1954 to make the Chairman the head of the Agency in the sense that the Director is here. The fact that I testified against it has never been recognized, nor any attention paid to it.

Senator Hickenlooper will recall that. I think he sat in on some of the hearings.

Senator SYMINGTON. Mr. Counsel?

Senator Hickenlooper?

Senator HICKENLOOPER. No.

Senator SYMINGTON. Well, Admiral, we want to thank you very much for being with us today and for the benefit of your testimony.

The committee will adjourn until 10 a. m. tomorrow. The first witness will be Secretary Quarles, the Deputy Secretary of Defense, and then Dr. Alan Waterman, the Director of the National Science Foundation, and in the afternnoon, Mr. Roy Johnson, Director of the

ARPA, the Advanced Research Projects Agency, and Dr. Herbert York, Chief Scientist of the Advanced Research Projects Agency.

The committee will stand adjourned until 10 a. m.

(Whereupon the committee recessed at 4:05 p. m. to reconvene at 10 a. m. on Wednesday, May 7, 1958.)

(The material for the record, supplied by Mr. Strauss, is as follows:)

ATOMIC ENERGY COMMISSION,
Washington, D. C., May 19, 1958.

Hon. LYNDON B. JOHNSON,
Chairman, Special Committee on Space and Astronautics,
United States Senate.

DEAR SENATOR JOHNSON: During my testimony before the Senate Special Committee on Space and Astronautics on May 6, 1958, the Commission was asked to furnish for the record certain information of interest to the committee in its consideration of S. 3609, the proposed National Aeronautics and Space Act.

In response to this request, I would first like to confirm my testimony that the General Advisory Committee furnishes advice to the Atomic Energy Commission and has no statutory function to advise the President.

Relative to my comments on subsection 7 (a) of the proposed act, staff members of the Atomic Energy Commission and the NACA have conferred, and an amendment to the Atomic Energy Act is being considered as a means to accomplish the desired objective concerning the use of restricted data information by the proposed Space Agency.

I believe that I can best answer Senator Saltonstall's request for the Commission's views on the 3-for-1 training agreement formula, set forth in subsection 6 (b) (12) of S. 3609, by pointing out that it is the Commission's policy to require the employee to commit himself in writing for a period of future employment based upon the dollar cost of his training rather than on the duration of his training. The cost criteria would appear to bear a more direct relationship to the burden borne by the Government, since short intensive periods of training are frequently more expensive and valuable than longer periods of intermittent or less intensive training; moreover, training arrangements involving intermittent instruction can be very difficult to handle administratively under the duration-commitment type of arrangement.

In accordance with your request for our views on what executive agencies would have an active interest in the functions to be performed under the proposes National Aeronautics and Space Act, we offer the following suggested list:

Department of Defense
National Science Foundation
Department of Commerce
Smithsonian Institution
Department of Justice
Department of State
Civil Aeronautics Board
Federal Communications Commission
Department of the Treasury
Department of Health, Education, and Welfare
Atomic Energy Commission

Without going into a detailed discussion, it is believed that each of these agencies has an interest, present or prospective, in the development of space technology and flight.

Sincerely yours,

LEWIS STRAUSS, *Chairman.*

NATIONAL AERONAUTICS AND SPACE ACT OF 1958

WEDNESDAY, MAY 7, 1958

UNITED STATES SENATE,
SPECIAL COMMITTEE ON SPACE AND ASTRONAUTICS,
Washington, D. C.

The special committee reconvened, pursuant to recess, at 10 a. m., in room 457, Senate Office Building, Senator Lyndon B. Johnson (chairman), presiding.

Present: Senators Lyndon B. Johnson, McClellan, Anderson, Symington, Bridges, Saltonstall, Bricker, and Mundt.

Also present: Edwin L. Weisl, consulting counsel; Eilene Galloway, special consultant; Dr. Glen P. Wilson, technical coordinator; Gerald W. Siegel, Stuart French, and Solis Horwitz, professional staff menbers.

Senator JOHNSON. The committee will come to order.

I want to acknowledge the presence of Senator McClellan and express my deep appreciation for his attendance at the committee yesterday and today in view of the fact that he is chairman of another committee that is holding hearings at the same time. I should like to say, Senator McClellan, I am willing at the conclusion of the Deputy Secretary's statement to yield my time in order that you might ask any questions of the Deputy Secretary, if you care to. Then you will have ample time if you need to go to another meeting.

Senator MCCLELLAN. Well, I thank you, Mr. Chairman. I may not want to ask any questions.

Senator JOHNSON. You have that privilege if you want to.

Senator MCCLELLAN. This is one issue that I am trying to learn about. I want to know about it, and I am trying to become informed.

Senator JOHNSON. We will be mighty glad to hear from you.

Our first witness this morning is the Deputy Secretary of Defense, Donald A. Quarles.

Mr. Quarles, will you please come to the committee table and bring any of your associates that you may desire to have at this meeting with you.

Mr. QUARLES. Thank you, Mr. Chairman.

STATEMENT OF DONALD A. QUARLES, DEPUTY SECRETARY OF DEFENSE; ACCOMPANIED BY ADM. JOHN E. CLARK, ASSISTANT DIRECTOR OF ADVANCED RESEARCH PROJECTS AGENCY; GEN. ROBERT H. WARREN, MILITARY ASSISTANT TO MR. QUARLES; JACK STEMPLER, ASSISTANT GENERAL COUNSEL, DEPARTMENT OF DEFENSE

Senator JOHNSON. Mr. Secretary, it seems that we have spent a good portion of the last 7 months across the committee table looking at each other. So I guess we don't need any lengthy introduction.

But for the benefit of the record, I ask to be inserted at this point a biographical sketch of the Deputy Secretary, the very able Mr. Donald A. Quarles.

(The biography referred to is as follows:)

BIOGRAPHY OF DONALD A. QUARLES, DEPUTY SECRETARY OF DEFENSE

Mr. Quarles was born in Van Buren, Ark., on July 30, 1894. He received his bachelor of arts degree from Yale in 1916. He has also received several honorary degrees.

He served 2 years in the Army during World War I attaining the rank of captain. He was employed by the Western Electric Co. (later the Bell Telephone Laboratories) in 1919 and became vice president in 1948. He became president of the Sandia Corp., a Western Electric subsidiary, in 1952.

He was appointed Assistant Secretary of Defense in 1953, Secretary of the Air Force in 1955, and Deputy Secretary of Defense in 1957.

He is a member of the American Institute of Electrical Engineers, the American Physical Society, the American Institute of Radio Engineers, the American Association for the Advancement of Science, Sigma Xi, and Phi Beta Kappa.

Senator JOHNSON. Mr. Quarles, you have a prepared statement, I see. Will you proceed in your own way to make your statement to the committee.

Mr. QUARLES. Thank you, Mr. Chairman and members of the committee.

It is a pleasure to appear before your committee to discuss the Department of Defense position in relation to the national program for space exploration. I understand that you are particularly interested in Defense Department views on the establishment of a National Aeronautics and Space Agency as set forth in the proposed bill, S. 3609.

In view of the fact that Mr. Roy Johnson and Dr. Herbert York of our Advanced Research Projects Agency will appear before you later, I will limit my statement to organizational aspects. Mr. Johnson and Dr. York will be in a position to present in considerably more detail the plans and programs of ARPA, including their relationship to other Government agencies.

We in Defense recognize that there are national objectives that go beyond the strict requirements of national security and therefore we support the concept that a civilian agency be made responsible for those phases of research in the aeronautical and space sciences that lie beyond the proper military interests.

The relationships between the National Advisory Committee for Aeronautics and the military departments over the years have been most constructive and satisfactory. Fundamentally, this was because each had confidence in the other, each recognized its proper area of activity and neither tried to encroach on the assigned task of the other. Both worked together in many common projects to which each contributed its special talents and special facilities. The X–15 project is a typical example. We think it is very important to preserve this kind of a relationship with the civilian organization responsible for research and exploratory work in the space field. We believe that the National Aeronautics and Space Agency, which this bill would create, would have the latitude to continue this kind of relationship and all of our contacts with the officials of NACA lead us to believe that they would propose to do so.

We believe the bill as drafted makes it possible to preserve the kinds of relationships with the military and civilian agencies that would best serve the national interests. However, to avoid any misunder-

standing I would like to state my interpretation of certain provisions of the bill.

In the statement of policy on page 2, line 4, the bill reads as follows:

> The Congress further declares that such activities should be directed by a civilian agency exercising control over aeronautical and space research sponsored by the United States, except insofar as such activities may be peculiar to or primarily associated with weapons systems or military operations, in which case the agency may act in cooperation with, or on behalf of, the Department of Defense.

It is my interpretation that this language sets forth the proper activities of the civilian agency and that it is not intended to define by exclusion or otherwise the proper activities of the Department of Defense. In other words, I would construe this language as not limiting the clear responsibility of the Department of Defense for programs that are important to the defense mission, including the support of research that is closely related to the defense mission. As in the case of present relationships between NACA and the Department of Defense, it is assumed that the programs of each will be properly coordinated and in final analysis subject to the direction of the President.

The President on April 2 directed the Department of Defense and NACA to review the space program as a whole and recommend to him a proper division of the program between ARPA and NASA. I would like with the committee's permission to have the President's memorandum made a part of the record so that the committee will have before it all relevant data in its consideration of this legislation.

Senator JOHNSON. Without objection the President's memorandum will be made a part of the record at the conclusion of the Secretary's statement. Do you have a copy to submit to the committee?

Mr. QUARLES. Yes, I do, and I will turn it over to the committee.

Senator JOHNSON. Proceed, Mr. Secretary.

Mr. QUARLES. Thank you.

This review, that is the review required in the memorandum, is well underway and will be covered in greater detail by Mr. Johnson and Dr. York.

Another section of the bill that deserves special attention is section 6 which defines the functions of NASA. It states in part:

> The Agency shall * * * (1) plan, direct, and conduct scientific studies and investigations * * * and (3) develop, test, launch, and operate aeronautic and space vehicles.

There is no doubt that the Agency should have the functions stated. It is my understanding that this in no way implies that the military departments would be precluded from similar activities if they serve a proper military purpose. In this connection, I should like to stress the importance of retaining flexibility of task assignment as between military agencies and NASA, for two reasons: first, this relationship will probably evolve as NASA grows in experience and competence in experimental missilry; and, second, the overall national interest will best be served by allowing the military and civilian agencies to work out between them the most effective use of their resources for carrying out these projects, all of course under the policy direction of the President.

I cite these points not as an argument that the language should be changed but merely to make sure that we are all similarly interpreting the language.

In summary, I would like to say that we already have a strong space program underway; that we do, in fact, enjoy close cooperation with NACA, the National Science Foundation, and the Scientific Community; that we support the establishment of the new National Aeronautics and Space Agency as proposed by S. 3609; and that we believe it will be possible, by continuation of the close cooperation with NACA and best use of available resources and facilities, to preserve the momentum of the present program and progressively to strengthen it to meet our national objectives.

(The President's memorandum of April 2 is as follows:)

THE WHITE HOUSE,
Washington, April 2, 1958.

Memorandum for—
The Secretary of Defense
Chairman, The National Advisory Committee for Aeronautics

I have today transmitted to the Congress a special message recommending the establishment of a National Aeronautics and Space Agency. A draft of legislation carrying out this proposal is being transmitted to the Congress by the Director of the Bureau of the Budget.

The new Agency will be based on the present National Advisory Committee for Aeronautics and will continue that Agency's well-established programs of aeronautical research. In addition, the new Agency will be responsible for programs concerned with problems of civil space flight, space science, and space technology. The instructions outlined below are concerned with these new activities.

The ultimate potentialities of space flight cannot now be fully grasped. Since some of these potentialities are clearly of significance from the standpoint of our national security, the Department of Defense will have a continuing interest in the programs to be undertaken and will continue to sponsor programs which may be peculiar to or primarily associated with military weapons systems or military operations as well as certain research and development which may be of a general supporting character. Furthermore, I desire that the skills and experience that have been developed within the Department of Defense be fully utilized in support of civil space programs. However, it is appropriate that a civilian agency of the Government take the lead in those activities related to space which extend beyond the responsibilities customarily considered to be those of a military organization.

I consider it especially felicitous that the National Advisory Committee for Aeronautics will provide the basic organization on which the new Agency will build. Not only does the National Advisory Committee for Aeronautics itself already have a firm understanding of the key problem areas involved and a tested method of approaching such problems, but also this organization and the Department of Defense have long enjoyed a highly productive working relationship. This relationship will ease the period of transition that lies ahead and will provide a basis for the close cooperation that will be needed to solve the difficult problems that will be encountered. It is intended that the new Agency continue to perform for the Department services in support of military aeronautics and missiles programs of the type now performed by the National Advisory Committee for Aeronautics and also provide similar services with respect to military space programs; the Department, in turn, will provide support essential to the success of the new Agency.

In order that necessary work proceed without loss of momentum pending enactment of the proposed legislation, in order that interim measures may be consistent with the intent of this legislation, and in order that implementation of the legislation, when enacted, may be promptly initiated, I desire that the Department of Defense and the National Advisory Committee for Aeronautics take the following actions:

1. The National Advisory Committee for Aeronautics should prepare and present to the appropriate committees of the Congress a full explanation of the proposed legislation and its objectives.

2. The National Advisory Committee for Aeronautics should proceed to formulate such detailed plans as may be required to reorient its present programs, internal organization, and management structure to carry out the functions to be assigned to the National Aeronautics and Space Agency, including the functions now being performed by the National Advisory Committee for Aeronautics, and should also plan and propose such additional actions and programs as may be necessary to implement the proposed legislation. Such actions would include determination of any requirements for additional staff, facilities, or funds that may be needed in the immediate future.

3. The Department of Defense and the National Advisory Committee for Aeronautics should jointly review the pertinent programs currently underway within or planned by the Department, including those authorized by me on March 27, 1958, and should recommend to me as soon as possible which of these programs should be placed under the direction of the new Agency. The Department of Defense and the National Advisory Committee for Aeronautics should also prepare an operating plan to assure adequate arrangements for utilizing in support of the new Agency, either by cooperative arrangements or by transfer to the new Agency, appropriate organizations, facilities, and other functions now within the Department. These actions should be taken in light of the fact that the proposed legislation contemplates that the new Agency will be given responsibility for all programs except those peculiar to or primarily associated with military weapons systems or military operations. Supporting research and development should be coordinated to provide for the needs of both military and civil programs without unnecessary duplication. It should be noted that Public Law 85–325 authorized the Department of Defense for a period of 1 year to engage in advanced space projects designated by me. The 1-year period will come to a close February 12, 1959. Since the new Agency will absorb the going organization of the National Advisory Committee for Aeronautics, it should be capable of assuming direction of appropriate programs prior to that date.

4. The National Advisory Committee for Aeronautics should discuss with the National Science Foundation and the National Academy of Sciences, as well as other governmental and nongovernmental bodies, the matter of participation of the Scientific Community on a continuing basis in planning and coordinating the scientific programs for the use of space vehicles in civilian space science. The best scientific judgment available in determining space science objectives should be utilized. Matters related to dissemination of the data collected should also be considered.

5. The Department of Defense should identify and report to me what programs now appear to be needed in support of well-defined military requirements. It is understood that the Advanced Research Projects Agency will continue to serve as the focal point for such programs within the Department.

Any problems that may arise in carrying out these interim instructions should be discussed with my Special Assistant for Science and Technology or with the Bureau of the Budget, as appropriate.

DWIGHT D. EISENHOWER.

Senator JOHNSON. Thank you, Mr. Secretary.

INTERPRETATION OF THE LANGUAGE OF SECTION 2 OF THE BILL

Mr. Secretary, the thing that impresses me about your statement is that apparently you have some serious questions as to the intrepretations that might be placed upon the language in this bill. I listened with great interest to your statement and I notice on page 2 you say:

However, to avoid any misunderstanding I would like to state my interpretation of certain provisions * * *

On page 3 your state:

It is my understanding that this in no way implies that the military departments would be precluded from similar activities * * *

On page 4 you say:

I cite these points not as an argument that the language should be changed but merely to make sure that we are all similarly interpreting the language.

Now, the committee, of course, has made no interpretation of the language. When you raise the question at least 3 time in a 4-page statement, I just wonder if you have coordinated your statement with other people in the administration, particularly those who prepared this bill, and if they are in agreement with you as to your interpretation of the language.

Mr. QUARLES. I think it is fair to say they are in agreement with me as to my interpretation of the language, and I think they also are in agreement that the present language may be properly interpreted as I have attempted to interpret it, Mr. Chairman.

Senator JOHNSON. And whom do you include under the term "they"—the Budget and the NACA?

Mr. QUARLES. Well, I can't speak for every individual, but I am speaking for NACA and my contacts with the top people in that organization, and also my contacts with the top people in the President's office who deal with such matters.

Senator JOHNSON. And you think there is a clear understanding among the administration people who would operate under this legislation as to lines of authority and where one starts and the other ends?

Mr. QUARLES. Among the responsible leaders of these organizations I believe that is right, Mr. Chairman. I think it would be going too far to imply that everybody involved does have this same interpretation of these words.

Senator JOHNSON. Are you aware of the fact that Mr. Johnson, the Director of ARPA, appeared before the House committee and suggested changing the wording of page 2, line 4, in section 2, which you favor?

Mr. QUARLES. I am aware of that, yes, Mr. Chairman. I think that that might be explained this way, that here is——

Senator JOHNSON. Are you in agreement with his suggestion?

Mr. QUARLES. Not that a change in wording is necessary, no, I am not, Mr. Chairman.

Senator JOHNSON. Then do you have a difference of viewpoint on the necessity of the amendment he suggested.

Mr. QUARLES. We do have that difference of viewpoint, yes, Mr. Chairman.

Senator JOHNSON. Would you care to elaborate?

Mr. QUARLES. Well, to say this, that I believe we were seeking the same interpretation. In other words, I believe that he, by his amendment, produces the same substance that I have attempted to achieve by my statement of interpretation of the words, but I do not believe that the amendment of the words is necessary to achieve this.

Senator JOHNSON. You would have no objection to the amendment, then, I assume, if it comes to the same substance that you seek.

Mr. QUARLES. I think I would have to say that anything that leaves the substance where I have tried to put it, Mr. Chairman——

Senator JOHNSON. I didn't understand your answer.

Mr. QUARLES. I say that I would have no objection to anything that left the substance where it now is.

SENATOR JOHNSON. And your opinion is that this amendment would leave the substance where it is now.

Mr. QUARLES. I haven't studied it that closely, but I believe it would.

Senator JOHNSON. Would you study it and inform the committee by letter whether or not you agree that it is better to change the wording by amendment and to say what you mean and mean what you say in the bill or whether you prefer to do it by testimony in the hearing?

Mr. QUARLES. I would be glad to review that point and respond by letter, yes, Mr. Chairman.

CURRENT LAWS, PROPOSALS, AND FUNDS RELATED TO OUTER SPACE DEVELOPMENT

SENATOR JOHNSON. Now, Mr. Secretary, the Congress has already passed during this session two laws providing for outer space programs; they are Public Law 85–325, H. R. 9739, enacted on February 12, to give the Secretary of Defense authority to engage in advanced military projects, and for 1 year to develop nonmilitary space projects designated by the President and Public Law 85–322, H. R. 10126, enacted February 11. This gives the Secretary of Defense authority to transfer appropriations which are available to the Department in the amount of $10 million for advanced research.

As I understand it, our outer space projects are now being carried on by the Advanced Research Projects Agency under the direction of Mr. Roy Johnson who reports directly to the Secretary of Defense. Is that a correct statement?

Mr. QUARLES. That is a correct statement, I think.

Senator JOHNSON. Now, there are four additional administration proposals on outer space pending before the Congress. They are: ARPA's appropriations for fiscal 1959; the administration bill providing for a new space agency; an estimate from the Bureau of the Budget for funds needed for the new agency over a 5-year period, 1959 to 1963, and the President's bill on the reorganization of the Department of Defense which contains recommendations relating to the military accomplishment of outer-space programs.

I wish to direct my questions toward a few of these proposals because they are interrelated and what we do about one of them may affect what is done in connection with the others.

First, the Department of Defense has asked for $520 million for advanced research projects for fiscal 1959. Is this the amount you intend to spend for both military and nonmilitary space projects for that period so far as you can see, at this time?

Mr. QUARLES. Not all for space projects, Mr. Chairman, but all—otherwise all for advanced research projects; it is the amount that we now expect to spend. However, I should explain that we expect to transfer some of those funds to the new organization when it is created.

Senator JOHNSON. All right. Now, how much more do you anticipate you would transfer and merge into this fund from other appropriations for related programs?

Mr. QUARLES. I know of none at this time. Some have already been transferred and merged in line with the authority the chairman cited earlier, but I know of no further plans to transfer and merge funds.

Senator JOHNSON. You do not contemplate transferring any funds to the military departments to carry on outer space programs?

Mr. QUARLES. None that have not already been transferred or that are not included in your total, Mr. Chairman. You are dealing, I think with a 1959 situation——

Senator JOHNSON. That is right. Fiscal 1959.

Mr. QUARLES—so that some of the actions that are contemplated there may not actually have been taken, but the numbers you cite are the total numbers in our present plan.

Senator JOHNSON. Now, if the Congress should establish a new space agency along the lines suggested or some similar agency, with a provision that you requested that space programs may be transferred to the space agency with concurrence of the Department of Defense, how many programs do you anticipate would be transferred?

Mr. QUARLES. As to number of programs, that depends on how you define a program. But may I answer your question this way, Mr. Chairman, that we expect to transfer those satellite programs and supporting research programs for them, including the very large engine development, as soon as this agency is created and ready to receive those, and this would be in total amount of $95 million of funds of those that you earlier mentioned from the fiscal 1959 availability.

Senator JOHNSON. Would you transfer personnel and hardware as well as funds?

Mr. QUARLES. There are no present plans to transfer personnel, although very possibly some military people would be assigned as we work out this program. I think we have no plans to transfer hardware, but we do assume that the Department of Defense will support these missions by providing hardware in many cases, particularly rocket hardware.

Senator JOHNSON. Do you expect to be reimbursed by NASA for the use of your outer space facilities, personnel, equipment, and so forth?

Mr. QUARLES. We have not worked out accounting matters of that kind. Certainly we would be reimbursed for some. I think we would not be reimbursed for such things as military personnel. I believe I can't answer that question yet with finality, Mr. Chairman.

Senator JOHNSON. What do you understand to be the meaning of the words of the bill that NASA "may act in cooperation with, or on behalf of, the Department of Defense"?

Mr. QUARLES. I understand——

Senator JOHNSON. I want you to elaborate on that.

Mr. QUARLES. Yes. "Act in cooperation with" I interpret to mean that they may continue the kind of cooperation we have had with NACA in which we join in organizing and carrying out research and exploratory projects. I would understand "cooperation" to mean that.

I would understand the words "on behalf of" to mean that in those Defense projects which NASA would appear to be in the best position itself to carry out, they might on request of Defense act on behalf of Defense in carrying out such projects and with Defense funds.

Senator JOHNSON. Now, this final question. I have many more but because of the time limitation we have set, I will conclude with this one.

DIVISION OF FUNDS AND PROJECTS BETWEEN DEPARTMENT OF DEFENSE AND THE NEW SPACE AGENCY

Would you say that division between the military and civilian space projects is already implicit in the amounts of money which are being requested by the Department of Defense and the proposed new agency?

Mr. QUARLES. I think, Mr. Chairman, when that division is finally made, it would almost fix the division of projects, but we still have the exercise of responding to the President jointly with NACA in recommending the division of these programs between the two organizations, and the funds that will flow with that divisional program.

Senator JOHNSON. And another question I must ask: Who has responsibility for making decisions to divide outer space projects between the agency and the Department of Defense?

Mr. QUARLES. The President, I would say, as things now stand, Mr. Chairman.

Senator JOHNSON. Thank you very much, Mr. Secretary.

Senator Bridges?

MILITARY ROLE IN SPACE DEVELOPMENT

Senator BRIDGES. Mr. Secretary, I joined with the distinguished chairman of this committee in introducing this legislation by request, but that doesn't necessarily mean that I approve of the bill in its entirety. I have some reservations on various points of it.

One is that I don't believe in overwhelming civilian control, but I do believe in the necessity of some of the points which you made. I have, in addition, suggested that it must be tied closer to the military than is now proposed in the bill. I think that with the general feeling in the country concerning civilian control, which I agree with in theory, we have made every effort in the drafting of this legislation to recognize that concept.

Now, personally I believe that in the final draft of this legislation there will be proposed a closer working relationship between the military and the civilian agency. I want to ask you if it isn't true that in the early stages, certainly, and for a long time, that in initial space exploration we will have to rely very heavily on military ballistic missiles as the boosters or thrust for these space vehicles, also that these missiles are now procured and are under the general control of the military?

Mr. QUARLES. For some time to come that is certainly true, that the reliance will be primarily on the military ballistic missile rockets.

MILITARY REPRESENTATION ON SPACE BOARD

Senator BRIDGES. Should this legislation be adopted as it is now written, it would mean that the military would have one representative on the Board, would it not? The President could, of course, appoint more than one but the legislation now specifies that only 1 of the 8 on the Board must be a member of the Military Establishment. I think there should be more.

Mr. QUARLES. Well, certainly from the point of view of membership on this new agency board, we would have only the one member assured, and in any event, we would be such a minority that we couldn't expect to have any control through that channel, and as presently drafted, the bill doesn't contemplate that that group of 17 would in fact control the program anyway. So I would say the division of the program, Senator Bridges—it is clearly one to be arrived at between the two agencies as far as possible, and on adjudication by the President as between the agencies where necessary.

PRESIDENT IS FINAL ARBITER

Senator BRIDGES. I understand the work of the space agency will include some projects having a potential military significance. Now, who is going to decide whether this work shall be done by the civilian space agency or by the military?

Mr. QUARLES. I would say in final analysis, again, if there were a difference of opinion between them, it would have to be decided by the President. However, I would point out that practical considerations will tend to decide that question because if we proceed, as I feel we should, and as I believe the NACA people feel we should, if we proceed with a national program and then decide how best to use our capabilities and resources, facilities, and all this—just the facts of life will in effect decide how the programs are organized.

Senator BRIDGES. Well, wouldn't the President, in deciding this, add one more duty to an already overloaded man and wouldn't the President be more or less a referee in the event certain problems cannot be resolved?

Mr. QUARLES. Well, I am sure he would have staff assistance in tackling any problem of this kind that might have to be presented to him. Of course, I believe that the two organizations will have such similar objectives and views about this matter that it will not be a frequent problem for the Chief Executive.

EXPANSION OF RESPONSIBILITY FOR DEVELOPMENT

Senator BRIDGES. In the past the NACA has never carried out any development projects. It has dealt primarily with basic research. Do you suppose that they are aware of the limited role which they have played in the past, and that they propose to continue it? The language of the bill would permit more, but you were rather general in your answer concerning this point, Mr. Secretary.

Mr. QUARLES. Well, I think that it is contemplated that they carry out what I believe one would call development projects, and it is true that in past development projects or past exploratory development projects like the X–15 project that we now have jointly between Air Force, Navy, and NACA, I believe that we should at least for the immediate future continue to cooperate using the military facilities and resources in the way X–15 now uses them, but at the same time, availing ourselves fully of the very, very great scientific potential that NACA has in this field, and, of course, one can expect they will build their potential in missilery up from where it is now. They have not attempted up to the present time any very extensive missile work.

PRIORITY OF USE OF MISSILE HARDWARE

Senator BRIDGES. Now, Mr. Secretary, assuming for a moment that this new space agency is in operation and the new space agency says, in effect, "we need four Atlas missiles for space exploration." Supposing the Air Force says that "we need those four Atlas missiles for the defense of this country."

Who is going to determine just who will get the missiles? Now, that is very important to me. I am for this space exploration, but the primary purpose of it, it would seem to me, is the defense of this country.

Mr. QUARLES. Right, Senator Bridges, and I think that priorities would prevail in answering that question. If the military priorities demanded these four missiles that you speak of, and unless the space program that was seeking them was of a higher priority than at least I am visualizing, I would assume that the Department of Defense and NASA would agree that higher priority should prevail, or if they don't agree, again, I think that it is a Chief Executive decision to say where the priorities are.

Senator BRIDGES. But it looks as though it is completely undetermined insofar as this particular bill is concerned; isn't that so?

Mr. QUARLES. I think that the bill does not settle this priority question. That is right. And, in fact, I would recommend that the bill not seek to settle the priority question.

Senator BRIDGES. Yet, someone has to make the decision. My question is that the President, who is already overburdened at the present time, and by necessity has to delegate many of the duties of his office, will have to rely on someone to spell it out insofar as it can be spelled out; isn't that true?

Mr. QUARLES. I think I would answer that "No" from my standpoint, Senator Bridges, because I feel an attempt to spell it out would tend to freeze a situation that should be left flexible because what may be an overriding priority today might not be tomorrow. We might, just to use your illustration, have plenty of Atlas rockets available for these other purposes or we might not, and it would depend on particular circumstances which I think the Executive would be in the best position to judge.

Senator JOHNSON. Thank you, Senator Bridges.

Senator Russell?

Senator Green?

Senator McClellan?

Senator Magnuson?

Senator Anderson?

DELETION OF MENTION OF AEC

Senstor ANDERSON. Secretary Quarles, yesterday in testimony Mr. Dembling recited what I had heard, that when the Atomic Energy Commission and the President were taking this into consideration, the Atomic Energy Commission was specifically mentioned in the bill. Mention of the AEC was taken out in the rewriting by the Bureau of the Budget.

Did the Department of Defense make a recommendation to take it out?

Mr. QUARLES. To the best of my knowledge it did not, Senator Anderson.

Senator ANDERSON. Did you participate in the discussions?

Mr. QUARLES. I certainly participated in the discussion of the bill, but not in each drafting change.

RELATIVE REPRESENTATION ON SPACE BOARD

Senator ANDERSON. In the changes in the bill the present structure of the NACA, which is 10 people from Government and 7 from private life, is changed to permit 9 from private life and 8 from Government. You were the head of Sandia Corp. in my home community and highly respected as such and still are fondly remembered by all of us. You did a great deal of buying. Do you believe the sellers should also be the buyers?

Mr. QUARLES. Well, as a generality I would have to say "No," Senator.

Senator ANDERSON. I am sure you would, because of all your experience. When you came to Sandia Corp. from Bell Telephone, you were very careful to preserve the proper relationship between them.

TRANSFER OF PROJECTS TO NEW AGENCY

Now, in the testimony of Dr. Doolittle, I asked him if it were possible by the provision of this bill to transfer Project Rover and Project Pluto from the Atomic Energy Commission to the space committee and he agreed it was, as I had thought after reading the bill. Do you believe that would be a good move?

Mr. QUARLES. If you mean by transfer the transfer of the technical work on these projects, I would not see a reason or an advantage in doing so, but that might be different from transfer to the new agency of project responsibility for it in the sense that they would, let us say, finance it and support it, but I believe it is now being carried out in that facility of the Government where it can at this stage best be carried out.

Senator ANDERSON. I thank you for that because I have read this bill very, very carefully and discussed it with a few people. The probabilities were that if the NACA operated as it has in the past, it could promptly transfer these away from Livermore and Los Alamos and transfer them to Ramo Wooldridge or some other private organization, and I think that would be a tragedy, and I don't see where it is permitted under the bill.

PROPULSION SYSTEMS

The development of nuclear propulsion is of extreme importance not only to the space project but eventually we may have to find we are going to need it in rockets themselves. If you get above the present weight limit of Atlas, would you not be in some trouble without nuclear propulsion?

Mr. QUARLES. Well, no.

Senator ANDERSON. No?

Mr. QUARLES. Not that. We are not that close to chemical fuel limit.

Senator ANDERSON. Well, has the Atlas with its full weight load ever taken off the ground?

Mr. QUARLES. Yes, it has taken off the ground.

Senator ANDERSON. Well, with a weight load to carry it 500 miles, but if you put in the materials that go into the nose cone and the weapon warhead which is classified as to its weight, just take the whole venture, has the full weight of it, the full 100,000 pounds, taken off the ground?

Mr. QUARLES. I think I shouldn't quite go into that, Senator Anderson, you will understand why.

Senator ANDERSON. Very well. They were talking about a million-pound-thrust engine. A million-pound-thrust engine, according to engineers who have testified, would weigh, with its necessary equipment, some 700,000 pounds. What sort of a specific impulse would be needed to take that off the ground? Could we do it with the present specific impulse?

Mr. QUARLES. Of liquid—theoretically we can do it with the present specific impulse of the liquid system.

Senator ANDERSON. Providing you find a new exortic fuel.

Mr. QUARLES. No. It isn't—while we would prefer a fuel with a higher specific impulse, we are not limited to finding a fuel of higher specific impulse theoretically to make such a system work. But I don't want to leave the impression that we feel at all we have solved these problems. As you well know, we have not, Senator Anderson.

Senator ANDERSON. Dr. Krafft Ehricke, who is with Convair Astronautics, a division of General Dynamics, has published a book, and on page 3 I want to read one paragraph:

> In regard to propulsion it need not be stressed that space flight beyond the level of the *Spirit of St. Louis* type of pioneer accomplishment must have a propulsion system of higher energy concentration available than is obtained with present chemical means.

Do you think he is trying to say that the type of thing we need is as far from what we now have as the *Spirit of St. Louis* is from a modern jet airliner?

> The nuclear power rocket engine might well mean for astronautics what the combustion engine means for aeronautics.

Now, if the nuclear development is that important, do you believe it should be taken away from the Atomic Energy Commission where it has been nurtured and put in the National Advisory Committee for Aeronautics where it has been at least hostilely received if not butchered?

Mr. QUARLES. At this time I would see no advantage and many disadvantages in making such a transfer, Senator Anderson.

Senator ANDERSON. Well, as Senator Bridges pointed out, we need to have some clarification of what is intended to be done. I am as anxious as I can be that these things stay in the hands of those very brilliant scientists that you admire just as much as I do and, have as much personal affection for as I do.

PRIORITY OF MILITARY OR CIVILIAN PROJECTS

When General Schriever was testifying recently he said the development of space weapons might take priority over nonmilitary space

exploration. Would that not mean that the military with its weapons system would have to consistently take priority over civilian work in this agency?

Mr. QUARLES. I think General Schriever's words, since they weren't qualified, would leave you with an unqualified priority, but as I say, I think that is a bit too broad, that there may be circumstances under which the space exploration should have a priority great enough to get what it needs in this business.

Senator ANDERSON. The President has talked about the peaceful exploration of outer space. Here is a man in charge of the project who says it must be military first and space afterward. It strikes me there might be a split concentration there. Mr. Simon Ramo of Ramo Wooldridge comes along and says 90 percent of the space program of the United States must remain under military control and direction for the security of the Nation. Does that mean that perhaps 10 percent might go to this new agency?

Mr. QUARLES. Well, of course, those are opinions of individuals. My own opinion is that the initial percent that should go to the new agency is very substantially higher than 10 percent. It is perhaps up in the range of 40 percent in our thinking as an initial break between the two agencies, and as the situation evolves, it might very well get to be a greater proportion.

I think it is a little too early to try to say just what that break should be.

Senator ANDERSON. Mr. Ramo, though, is not just an ordinary individual. He is a man to whom the whole group turned because it couldn't organize a program itself, and he has thousands of employees. One time it took me nearly 3 hours to find anybody in the Ramo Wooldridge Corp. who knew who Mr. Ramo was. They thought it was a trade name.

NO MENTION OF PATENTS IN BILL

Now, let me ask you this. Is there any provision in this bill with reference to patents?

Mr. QUARLES. I think there is no specific provision in this bill for patents.

Senator ANDERSON. No. So that whoever developed the project could patent it and claim it and keep it as his own; one of these private groups.

Mr. QUARLES. Well, I don't think I would like to agree with that, but you are in a much better position to have an opinion about that than I am, Senator.

Senator ANDERSON. Only because the burnt child fears the fire, and we went through this in Atomic Energy Commission for a long, long time.

Would it not be well to try to protect it as we get underway, perhaps?

Mr. QUARLES. Well, I think we have been assuming in the Department of Defense that the work that this agency would carry on with Government funds and for the Government would carry with it the same kind of patent provisions that our own work carries with it, and this is well established by law and practice, and I had assumed that the same practice would apply to the new agency. I will assume it not as a lawyer, however.

Senator ANDERSON. Neither of us is a lawyer, so we are in fine shape to talk freely about the law.

CURRENT NUCLEAR PROJECTS

Finally, now, Project Pluto is important for defense as well as very interesting for civilian speculation. Has the Defense Department not had pleasant relationships with the Livermore Laboratory and Dr. York when he was out there in the development of Pluto?

Mr. QUARLES. I would say they have had fine relationships throughout that development.

Senator ANDERSON. I think it is excellent.

I think you military people have done a fine job of working with him.

Now, on Project Rover you have also had with the Los Alamos group a very fine relationship.

Mr. QUARLES. That is correct.

Senator ANDERSON. Do you think there might be a danger of stepping in and disturbing those relationships? Maybe I shouldn't say it that way. Maybe I should say would you not like to see that present relationship continue in the development of these weapons?

Mr. QUARLES. I would like to see that relationship continue in its present effectiveness; yes, sir.

Senator ANDERSON. I saw the mock-up of the first device that Rover is likely to use. I was amazed that they had made as much headway as they had.

Now, the atomic part of it is perhaps getting along a little less rapidly and they could establish another line of research that would cost maybe a million and a half dollars and would be very, very valuable.

Nobody has asked for that at all. That is what I am afraid will happen if we don't keep this in the hands of some people who are interested in its development. It would be a very valuable piece of insurance to this country as far as civilian space flight is concerned, and I think as far as military flight is concerned.

I think I have more than used up my time.

Senator JOHNSON. Thank you, Senator Anderson.

Mr. Secretary, I notice your reply to Senator Anderson's question on the lack of adequate patent protection so far as the statute is concerned is based on what you assumed would be the case.

Would you ask the counsel to prepare for the committee a memorandum on what is the case as they understand it, together with any recommendations in that field that the Department might be inclined to make?

Mr. QUARLES. I would be glad to do so, Mr. Chairman.

Senator JOHNSON. Thank you.

Senator Wiley?

Senator Hickenlooper?

Senator Saltonstall?

Senator SALTONSTALL. Thank you, Mr. Chairman. Just a very few questions, Mr. Quarles. Maybe some of these questions are duplication because it is very difficult to hear, down at this end of the room, all of the questions that have been asked.

PEACEFUL AND MILITARY USES OF SPACE

Mr. Quarles, with your background as a researcher and as a scientist, of course you believe that an active effort should be made to understand and develop space essentially for peaceful pursuits; do you not?

Mr. QUARLES. I believe that there should be active exploration of space and development of the space sciences. When you say, Senator Saltonstall, essentially for peaceful uses, I have to condition that on others who are in this, other countries who are in this field similarly directing their programs toward peaceful uses, and I would have to say that it would perhaps not be right for us unilaterally to limit our space exploration to peaceful uses.

Senator SALTONSTALL. I agree with that.

My next question was along those same lines. Of course, we have got to develop space for our security as well as for peaceful purposes. Now, the great problem is as to whether the development of space for military and peaceful purposes can be carried forward together without, we will say, the military one dominating the peaceful one. Is that going to be one of our big problems?

Mr. QUARLES. Well, I haven't felt it was a big problem, but perhaps I should define what I mean by the military uses and the peaceful uses.

I conceive that it is the function of the military until such time as we have safeguarded agreements that will relieve us of this responsibility, it is the function of the military to understand the potentiality of sciences such as space sciences and to be resourceful in applying those potentialities to useful military devices of one kind or another.

On the other hand, I conceive it to be the purpose of civilian science to keep pushing out the frontiers of scientific knowledge, not for any stated civilian use—because there might be a complete absence of any apparent civilian use in the ordinary sense of the word—but just because we all believe that pushing out the frontiers of scientific knowledge is a socially useful thing to do and sooner or later we'll have uses that might be for the security of the country or it might be for some other benefit of the country.

Senator SALTONSTALL. Well, the great question in my mind is whether or not if the military has a substantial amount of funds for this development and for this research, whether the civilian end of it, the peaceful end of it, will be given enough consideration. That is one of the great problems that is going to face us; is it not?

Mr. QUARLES. I think that will be a problem, but I don't think of it as a barrier at all here, because I believe the apportionment of funds can be handled properly, and in fact, that there is already a mechanism underway to handle this properly under the policy direction of the President.

Senator SALTONSTALL. And you agree that, of course, we should go forward just as fast as we can with the funds available and with the knowledge that we have by ourselves, but it would be wiser and more helpful to get as much international cooperation as we can.

Mr. QUARLES. I agree with both of those things; yes, sir, Senator Saltonstall.

Senator SALTONSTALL. And we should, without giving up any of our security, interchange ideas to the best of our ability?

Mr. QUARLES. Yes, within—and I am sure this is what you mean—security bounds, I think we should cooperate in space sciences.

CHANGES IN LANGUAGE OF THE BILL

Senator SALTONSTALL. Now, coming down to the terms of this bill, you stated to the chairman that you were present and helped draft it, or were present when its terms were considered?

Mr. QUARLES. Well, I would say that I was present. I was not physically present in the drafting place. I did consult with and participate in the consideration of the bill and in its drafting; yes, sir.

Senator SALTONSTALL. And in your statement you emphasized flexibility in the language.

Mr. QUARLES. I did, yes, sir.

Senator SALTONSTALL. Now, from the experience that I have had up here, and particularly with military questions and appropriations questions, we want to have our language in the legislation just as clear as possible to leave as little as possible to contrary interpretation, don't we?

Mr. QUARLES. I would say yes.

Senator SALTONSTALL. And it would seem to me this bill as it is presently drafted, without losing its flexibility, could have a number of improvements for clarity.

Mr. QUARLES. Well, I would defer to your judgment on that, Senator Saltonstall.

Senator SALTONSTALL. You wouldn't oppose language changes; this bill is not letter perfect, in your opinion?

Mr. QUARLES. I couldn't take that position; no, sir.

DIVISION OF PROJECTS AND FUNDS

Senator SALTONSTALL. Now, you stated that under this bill, S. 3609, the defense funding would be used to help the Space Agency. I wasn't sure from your testimony to the chairman how this would be done. What would be the determining factor? Would it be done by agreement between Defense and the Space Agency, or would it be done by order of the President? Would it be done by order of the Secretary of Defense as helpful to our security, or how?

Mr. QUARLES. Senator Saltonstall, I think before you came in I introduced into the record, with the permission of the chairman, the President's letter of April 2 which directs the Department of Defense and the National Advisory Committee for Aeronautics to review this whole program situation and to recommend to the President a division between them, including a division of the funds—a division of the projects and a division of the funds. We are in the process of working that out with the National Advisory Committee.

Senator SALTONSTALL. Then it would be done by agreement and, finally, by order of the President?

Mr. QUARLES. Exactly; yes, sir.

GIFTS TO THE NEW AGENCY

Senator SALTONSTALL. Now, one of the provisions of the bill that I noted yesterday permits gifts to the Agency to further its purposes. Do you approve of that? It is a new provision, so far as I know. I brought it up yesterday with Admiral Strauss. It would seem, to me, a rather troublesome provision.

Mr. QUARLES. Senator Saltonstall, I missed one word in your question that made me not understand it completely. Would you be good enough to repeat it?

Senator SALTONSTALL. One of the provisions of this bill permits gifts by private individuals and private corporations to the Agency to further its purposes. That is at the bottom of page 7, section 6 (b) (4), Senator Bridges calls to my attention. Now, isn't that a troublesome provision? Page 7, line 24.

Mr. QUARLES. Yes; I see the place.

Senator SALTONSTALL. It seems to me the Agency should proceed on its own and not accept private funds. To have the Agency accept gifts seems, to me, to be a new principle.

Mr. QUARLES. I hadn't thought of the exposure there, and I hadn't thought it was very likely that people would be stepping up and offering things to the Government for this kind of a program. Most of them are very expensive.

Senator SALTONSTALL. Do you know why that provision was put in?

Mr. QUARLES. I thought that it had to do with private organizations, such as the organizations of scientists who have been working in this field, and universities, and places of that kind that have some facilities, and I thought the purpose here was merely to make it possible to integrate whatever they might have to offer into the Government's program without any issue of compensation to them if they didn't seek compensation.

Senator SALTONSTALL. Well, then, that language could be very much clarified, if that is the purpose.

Mr. QUARLES. I have to confess that I haven't studied this part; that is, the implication of that part of the act.

EXPENDITURES FOR BASIC RESEARCH IN AERONAUTICS AND SPACE

Senator SALTONSTALL. Now, there are two other broad questions I would like to ask you, very briefly. How much basic research is now done and carried forward in the Department of Defense by contract with universities and so on, in space and in aeronautics generally?

Mr. QUARLES. In space and in aeronautics, as of the present time, I think we could identify only a small amount of research. We have, perhaps, something in the range of $75 million to $100 million of Defense funds that go into basic research, but only a small fraction of this would deal with aeronautics, in a literal sense.

Senator SALTONSTALL. So that the basic research in aeronautics is now being done by the NACA, so far as the Government is concerned.

Mr. QUARLES. In very large measure, yes.

Senator SALTONSTALL. So that, presumably, it would be carried forward by this new Space Agency in the future?

Mr. QUARLES. In very large measure, it would continue to be.

Senator SALTONSTALL. So that we have the problem of working out the division of funds if this basic research is to be carried out by this new Agency, the problem of how much Defense money should go into it.

Mr. QUARLES. Yes. We would have that problem. I think, actually, there should continue to be Defense support of some kind of basic research that would be pertinent to this aeronautics and space

area. As I think you know, there is an Executive order, 10521, which charges the executive departments with continuing to support some amount of basic research in fields that underlie their missions, and we would think that is still a good Executive order, and that it should apply also in the space area.

(The Executive order referred to is as follows:)

MARCH 17, 1954—EXECUTIVE ORDER CONCERNING GOVERNMENT SCIENTIFIC RESEARCH, THE NATIONAL SCIENCE FOUNDATION, AND THE INTERDEPARTMENTAL COMMITTEE FOR SCIENTIFIC RESEARCH AND DEVELOPMENT

TITLE 3—THE PRESIDENT

EXECUTIVE ORDER 10521

ADMINISTRATION OF SCIENTIFIC RESEARCH BY AGENCIES OF THE FEDERAL GOVERNMENT

WHEREAS the security and welfare of the United States depend increasingly upon the advancement of knowledge in the sciences; and

WHEREAS useful applications of science to defense, humanitarian, and other purposes in the Nation require a strong foundation in basic scientific knowledge and trained scientific manpower; and

WHEREAS the administration of Federal scientific research programs affecting institutions of learning must be consistent with the preservation of the strength, vitality, and independence of higher education in the United States; and

WHEREAS, in order to conserve fiscal and manpower resources, it is necessary that Federal scientific research programs be administered with all practicable efficiency and economy; and

WHEREAS the National Science Foundation has been established by law for the purpose, among others, of developing and encouraging the pursuit of an appropriate and effective national policy for the promotion of basic research and education in the sciences:

NOW, THEREFORE, by virtue of the authority vested in me as President of the United States, it is hereby ordered as follows:

SECTION 1. The National Science Foundation (hereinafter referred to as the Foundation) shall from time to time recommend to the President policies for the Federal Government which will strengthen the national scientific effort and furnish guidance toward defining the responsibilities of the Federal Government in the conduct and support of scientific research.

SEC. 2. The Foundation shall continue to make comprehensive studies and recommendations regarding the Nation's scientific research effort and its resources for scientific activities, including facilities and scientific personnel, and its foreseeable scientific needs, with particular attention to the extent of the Federal Government's activities and the resulting effects upon trained scientific personnel. In making such studies, the Foundation shall make full use of existing sources of information and research facilities within the Federal Government.

SEC. 3. The Foundation, in concert with each Federal agency concerned, shall review the scientific research programs and activities of the Federal Government in order, among other purposes, to formulate methods for strengthening the administration of such programs and activities by the responsible agencies, and to study areas of basic research where gaps or undesirable overlapping of support may exist, and shall recommend to the heads of agencies concerning the support given to basic research.

SEC. 4. As now or hereafter authorized or permitted by law, the Foundation shall be increasingly responsible for providing support by the Federal Government for general-purpose basic research through contracts and grants. The conduct and support by other Federal agencies of basic research in areas which are closely related to their missions is recognized as important and desirable, especially in response to current national needs, and shall continue.

SEC. 5. The Foundation, in consultation with educational institutions, the heads of Federal agencies, and the Commissioner of Education of the Department of Health, Education, and Welfare, shall study the effects upon educational institutions of Federal policies and administration of contracts and grants for

scientific research and development, and shall recommend policies and procedures which will promote the attainment of general national research objectives and realization of the research needs of Federal agencies while safeguarding the strength and independence of the Nation's institutions of learning.

SEC. 6. The head of each Federal agency engaged in scientific research shall make certain that effective executive, organizational, and fiscal practices exist to ensure (a) that the Foundation is consulted on policies concerning the support of basic research, (b) that approved scientific research programs conducted by the agency are reviewed continuously in order to preserve priorities in research efforts and to adjust programs to meet changing conditions without imposing unnecessary added burdens on budgetary and other resources, (c) that applied research and development shall be undertaken with sufficient consideration of the underlying basic research and such other factors as relative urgency, project costs, and availability of manpower and facilities, and (d) that, subject to considerations of security and applicable law, adequate dissemination shall be made within the Federal Government of reports on the nature and progress of research projects as an aid to the efficiency and economy of the overall Federal scientific research program.

SEC. 7. Federal agencies supporting or engaging in scientific research shall, with the assistance of the Foundation, cooperate in an effort to improve the methods of classification and reporting of scientific research projects and activities, subject to the requirements of security of information.

SEC. 8. To facilitate the efficient use of scientific research equipment and facilities held by Federal agencies:

(a) The head of each such agency engaged in scientific research shall, to the extent practicable, encourage and facilitate the sharing with other Federal agencies of major equipment and facilities;

(b) a Federal agency shall procure new major equipment or facilities for scientific research purposes only after taking suitable steps to ascertain that the need cannot be met adequately from existing inventories or facilities of its own or of other agencies; and

(c) the Interdepartmental Committee on Scientific Research and Development shall take necessary steps to ensure that each Federal agency engaged directly in scientific research is kept informed of selected major equipment and facilities which could serve the needs of more than one agency. Each Federal agency possessing such equipment and facilities shall maintain appropriate records to assist other agencies in arranging for their joint use or exchange.

SEC. 9. The heads of the respective Federal agencies shall make such reports concerning activities within the purview of this order as may be required by the President.

DWIGHT D. EISENHOWER.

THE WHITE HOUSE, *March 17, 1954.*

Senator SALTONSTALL. It seems to me the language ought to be cleared up on this. My time is up, Mr. Quarles, but I would just like to say this. I will make it a statement rather than a question.

QUESTION OF NOTIFYING CONGRESS ON TRANSFER OF AGENCIES

Section 8 of the bill in its present form is disturbing, because it would allow agencies, with the approval of the President, to transfer whole departments or powers and activities into other departments without any knowledge being given to Congress, and my suggestion is that some form of notification to Congress, along the lines of the executive reorganization plan, or perhaps not quite as broad as that, certainly should be included in this bill. Otherwise, we won't know to whom we are appropriating money, and we won't know who is ultimately going to do the work when we consider appropriations. I would strongly urge that this section be carefully considered.

Thank you, Mr. Chairman.

Senator JOHNSON. Thank you, Senator Saltonstall. I should appreciate, Senator Saltonstall, your conferring with counsel and making

suggestions as to appropriate language that you think would cover the deficiency, as you see it, in that section. I know all members recognize the Senator from Massachusetts as one of our most able draftsmen, and I quite agree with him that, if Congress has any function, it ought to express itself and should not delegate completely such broad, sweeping powers. If the Senator from Massachusetts will confer with counsel when we are not in session, we will have some amendments drafted along the line that he has expressed.

Senator SALTONSTALL. I appreciate that, Mr. Chairman. I will be glad to do so. I would also, if I may reply to the chairman, use this opportunity—he is asking the Deputy Secretary of Defense to submit in writing certain answers to his questions. I think it would be extremely helpful if Mr. Quarles would give us the background of subsection 6 (b) (4), which authorizes the Agency "to accept gifts or donations of service, money, or property," et cetera. If we could have that in writing, I think it would be extremely helpful, if the chairman agrees.

Mr. QUARLES. I will be glad to do so, Senator Saltonstall.

Senator SALTONSTALL. Would the chairman answer that question of mine? Does he agree that Secretary Quarles could helpfully give us information?

Senator JOHNSON. Yes, and I should like for him to submit a memorandum, if he will, along the indicated lines. I was asking a question of counsel, because he expressed the thought last night that there was a law that covered the general area. I was asking if he would check it, and I didn't hear all of the Senator's statement. But, if the Secretary will comply, the committee will appreciate it.

Mr. QUARLES. Yes, sir.

Senator JOHNSON. Senator Symington?

Senator ANDERSON. He was just called out.

Senator JOHNSON. Senator Bricker?

Senator BRICKER. No questions.

Senator JOHNSON. Senator Mundt.

Senator MUNDT. Mr. Chairman, I think I have only one question. Conceivably, this could have been covered before I came into the room.

QUESTION OF INDEPENDENT AUTHORITY FOR DEFENSE DEPARTMENT

On page 2, in section 2, Mr. Secretary, I direct your attention to the language starting with line 4, and I have a question.

> The Congress further declares that such activities should be directed by a civilian agency exercising control over aeronautical and space research sponsored by the United States, except insofar as such activities may be peculiar to or primarily associated with weapons systems or military operations, in which case the agency may act in cooperation with, or in behalf of, the Department of Defense.

I was wondering why, in times like those and in situations like that, it wouldn't be wise for the Department of Defense to have some independent authority to act on its own in the field in which it has special responsibilities.

Mr. QUARLES. Well, Senator Mundt, I agree that the Department of Defense should have independent authority to act on its own in carrying forward the military projects in space as well as elsewhere, and I would construe this legislation as leaving such authority where it now is, namely, authorized by other legislation, and that these

words should not be read as a limitation on the military authority, but merely as a granting of certain authority to a civilian agency.

Senator MUNDT. Congress has had some experience with the doctrine of preemption, and I was a little bit concerned that this might be construed to mean that while the agency might act, there is nothing there in the language, at least, to indicate that the Department of Defense would continue its time-honored responsibilities of having independent power of action in those areas for which it has specific responsibility.

If you are positive that the language could not be misconstrued, if you are positive that this does keep the necessary authority and responsibility in the Department of Defense for those items, I suspect perhaps it is all right. It could be clarified by changing the language somewhat so that it could never be misconstrued.

Mr. QUARLES. Senator Mundt, I think the only thing I am personally positive about is that the legislative history plus the act must leave the Department of Defense in the position of being able to carry forward military projects in this field, and I will express the opinion that it does so, but that is only worth what my opinion is worth.

Senator MUNDT. Well, I would certainly want that to occur.

I am curious whether the language actually provides it.

That is all, Mr. Chairman.

CRITERIA FOR MILITARY OR CIVILIAN PROJECTS

Senator JOHNSON. Mr. Secretary, General Doolittle testified before the House committee that a reconnaissance satellite is military, and I think you testified it is not.

I want to ask some questions:

Who would determine whether a reconnaissance satellite is military or not, and do you know whether any criteria have been formulated for making such a determination?

Mr. QUARLES. Senator Johnson, I am sorry I missed some words in what you said, and I am not sure I have the sense of your question.

Senator JOHNSON. I am informed that General Doolittle testified before the select committee of the House that a reconnaissance satellite is military; whereas, you testified in your opinion it was not military.

Who would determine whether a reconnaissance satellite is military or not, and do you know whether any criteria have been formulated for making such a determination?

Mr. QUARLES. Well, may I say first that I think a reconnaissance satellite is military, and I never meant to give any other impression.

I think that the record would show that before the House I expressed the opinion that a reconnaissance satellite could not be regarded as offending a country over which it might be passing on the theory that it is in outer space, and it is essentially inoffensive, since there is nothing that it can do to harm the country over which it was passing; and I supported that view by the fact that we all took for granted the inoffensive character of the two sputniks, both of which passed over our country repeatedly, and either one of which might have been collecting intelligence if there had been a reason, if the Soviets had found a reason for them to do so.

So, I think there isn't a difference of opinion between General Doolittle and myself on this point. I agree that it is a military de-

vice, in a proper military program; but I would make the point that I do not regard it as offensive with respect to the country over which it passes.

Senator JOHNSON. And the answer to the question: Do you know whether any criteria have been formulated by anyone for making such a determination?

Mr. QUARLES. Of course, this will be implicit in the determination that is now being made as between the two agencies for the approval of the President, but I can say in advance that both agencies regard a reconnaissance satellite as part of the military program.

MILITARY AND CIVILIAN COOPERATION

Senator JOHNSON. Now, just one more point before the counsel asks some questions:

Would you agree that our primary task is to get full cooperation between our professional civilian and professional military experts in the use of outer space facilities and equipment?

Mr. QUARLES. I would agree that that is our purpose.

Senator JOHNSON. And in your opinion, after careful study of this proposal, do you think it would do that?

Mr. QUARLES. I think that it would do that, if the chairman will allow me to interpret it as I did in my statement.

Senator JOHNSON. Do you completely, unreservedly, wholeheartedly endorse the pending legislation?

Mr. QUARLES. I do endorse the pending legislation; yes, sir.

Senator JOHNSON. Counsel?

SPECIFICITY OF TERMS AND FUNCTIONS

Mr. WEISL. Mr. Secretary, an examination of this proposed legislation discloses that it is lacking in many respects, when compared to other legislation in similar situations.

For instance, taking the atomic energy legislation, we find several pages devoted to the definition of terms. It points out what is an "agreement for cooperation;" what the term "atomic energy" means; and so on.

We find there is no definition of terms whatsoever in this proposed legislation.

We also find in the Atomic Energy Act a specific itemization of functions, not a general itemization such as we find here.

For instance, we find in the Atomic Energy Act a statement such as this:

> The Commission is authorized to, (1) conduct experiments and do research and development work in military application of atomic energy; (2) engage in the production of atomic weapons * * *

et cetera.

We find no such statement whatever in this legislation.

We also find in the Atomic Energy Act several pages devoted to international cooperation, spelling out how international cooperation shall be limited, the extent of it, and how it shall take place.

We find nothing whatever on that subject in this proposed legislation.

We also find that in the Atomic Energy Act a Commission is created consisting of several Commissioners, with each Commissioner having a vote. The Chairman presides at the meetings but has only one vote, the same as any other member.

Here we find a huge Advisory Board that meets four times a year that merely is consulted but has no power except to recommend—and we find one Director who is vested with the responsibility of carrying out these general functions, but with no authority to decide what function is military, what function is civilian, what function belongs to the Defense Department, what function belongs to this Agency.

There are many other elements lacking in this legislation, but I merely call attention to these.

Now, don't you think legislation of this importance should be enacted so that its terms and its functions are clearly understood?

Mr. QUARLES. Yes; Mr. Weisl, I certainly think it should; and, in responding that way, I wouldn't like it to be construed as thinking the present bill does not. And if I might have a moment to elaborate on that, perhaps there are terms in the bill that need definition, and here again I speak not as a lawyer, but it would seem to me that the terms were common parlance terms that perhaps did not need definition.

I don't at all hold against a definition if it is needed.

There are many situations in which this space problem is different from the atomic energy problem, and I think it would be perhaps inappropriate to draw too close a parallel between this and the Atomic Energy Act.

However, I wouldn't at all want to imply that the act is perfect in its drafting. That just isn't my function.

Mr. WEISL. Yes, sir.

COMMUNICATIONS AND WEATHER PROJECTS

Mr. Secretary, for instance, in this act, the agency is given authority over aeronautical and space research sponsored by the United States, except, as you pointed out in your statement, insofar as such activities may be peculiar or primarily associated with weapons systems or military operations.

Now, General Doolittle pointed out some of the research functions that he thought this civilian agency would undertake, and among them he pointed out the field of communications.

Certainly, communications are related to military operations, are they not?

Mr. QUARLES. Yes, they are.

Not exclusively, of course. The military is certainly interested in communications possibilities and I can easily conceive that the first applications of the space sciences in the communications field might well be military applications.

Mr. WEISL. Well, wouldn't there be an overlapping or a struggle for jurisdiction over the field of communications?

Where would you put the research on communications for military purposes, and where would you put the research on communications for civilian purposes?

Certainly the Government isn't concerned, is it, as you pointed out to me, with commercial communications.

Mr. QUARLES. I would think that was right, that when it comes to engineering applications, the Government would be most apt to be concerned with military applications rather than civilian applications of the communications art; but I believe General Doolittle may have been referring to something more basic.

There is an understanding, for example, of what kinds of radiations exist in this outer space and what kinds of radiations can be propagated through it. These are scientific matters, and they are elements of science that would be basic to any communications application.

I would say that it is quite in order for NASA, as it would be created, to concern itself with these basic scientific facts, and the phenomena of nature in back of them, but not to concern itself with applications of these to communications systems.

Mr. WEISL. And wouldn't the same apply to weather control?

Mr. QUARLES. Yes, although not quite as completely; because I think very clearly there is a civilian interest in weather and weather phenomena, and weather prediction, and whatnot, as well as a military one.

Mr. WEISL. In fact, with respect to all of these general functions that are spelled out in this act, the Defense Department has been for many years engaged in research in all of them and has spent billions of dollars in research in all of those functions.

CURRENT RESEARCH PROJECTS IN ARMY, NAVY, AND AIR FORCE

Now, you pointed out, Mr. Secretary, ARPA will transfer to this new Agency certain of its projects that it has planned to go into. These same functions are, however, now being performed by the Army research department, by the Navy research department and by the Air Force research department.

Now, what will become of those projects? Will they also be transferred to this new Agency?

Mr. QUARLES. The research functions in the Army, Navy, and Air Force in this field of space have within the Defense Department been pulled together in the ARPA agency. This isn't to say that all research in Army, Navy, and Air Force has been pulled into ARPA but merely the space research.

Now, I should also explain that in very large measure the Defense Department as a whole has left aeronautical research to the National Advisory Committee for Aeronautics, so in that particular field, and this is special, in that particular field most of the research work for the Government has been done by the National Advisory Committee rather than by the Department of Defense. So there isn't a big change contemplated in that particular area.

Mr. WEISL. Well, in that respect you wouldn't need this legislation at all.

Mr. QUARLES. Not in respect to the basic research work except that this has in the past been defined for the National Advisory Committee as work in the aeronautics field; and moving out into space beyond the air perhaps needs a new definition.

Mr. WEISL. Well, has experimentation and research for the development of satellite vehicles and ballistic missiles been taken out of the Army, Navy, and Air Force and transferred to ARPA?

Mr. QUARLES. Yes. For those things that are special to this space program, and I must make that distinction because, of course, a lot of our missile work—missiles move through space but we are not defining ballistic missiles work as part of the space program.

Mr. WEISL. Yes; but doesn't a missile which travels in outer space involve the same propulsion, the same guidance, the same reentry problem that any other kind of a vehicle, whether it be a space platform or a reconnaissance satellite or a weather observatory involves? Doesn't that involve exactly the same mechanism, the same problem?

Mr. QUARLES. There is a large community of interest there, but the areas are not identical.

In the first place, again, the National Advisory Committee for Aeronautics has done a lot of research work in the propulsion fields that we use for our missile programs, and they would, we assume, continue to do so.

In the second place, the space program will be interested in propulsion systems that go beyond those that we are immediately interested in in the missile program.

For example, the million-pound propulsion system we regard as primarily a space propulsion system rather than a missile propulsion system. So there is a large area of overlap, but there is also an area in which they are not identical.

Mr. WEISL. Well, isn't it in this area of overlap where all this rivalry and competition for power and funds takes place?

Mr. QUARLES. I can only say that up to the present time it has not taken place between the National Advisory Committee for Aeronautics and the Defense Department. We have participated closely in their programs and supported them fully without any effort on our part to duplicate them.

Mr. WEISL. Thank you, Mr. Secretary. My time is up.

Senator JOHNSON. Senator Saltonstall?

Senator SALTONSTALL. Mr. Chairman, just one question, and I thank you.

COMPOSITION OF BOARD AND RELATIONSHIP TO DIRECTOR

Mr. Quarles, returning to page 3, section 4, this section would place the control of this Agency—or this Advisory Board—outside of the Government officials by a vote of 9 to 8, assuming that the President appoints outside of the Government. Do you believe in that?

Mr. QUARLES. For an advisory board that seems to me to be quite an acceptable arrangement. That is, the 8-to-9 split.

Of course, if this were to be an authoritative board the way the NACA Board now is, I think it would be a real question whether this would be wise.

Senator SALTONSTALL. Then you do come into this situation: (1) men outside of the Government could control the advice of the Board; and (2) the Director who does not have to follow the advice of the Board. So you might have a very serious conflict that might come into a great deal of public disagreement and perhaps controversy. That would be unfortunate, would it not?

Mr. QUARLES. I think that is a potentiality, but I don't think it is a likelihood that you would develop that kind of a split between the Advisory Board and the Director. Of course, the Advisory Board

has access also to the President and I think we must assume that the Executive will pull this together and see that the program is the wisest program that can be established.

Senator SALTONSTALL. Should the Director be a member of the Advisory Board, in your opinion?

Mr. QUARLES. I would think not, because it is his function to receive the advice.

Senator SALTONSTALL. You would feel that this section is one that the committee should give very, very careful consideration to, would you not?

Mr. QUARLES. Yes, indeed. I should think it should, although I think that goes for all sections, Senator Saltonstall.

Senator SALTONSTALL. Yes, but what I had in mind was that it seems to me this language, as it is now drawn and as the Board would be constituted, has the possibility of leading to a serious controversy which, if aired in public, might be very, very unfortunate.

Mr. QUARLES. Yes. Well, I think we certainly want to avoid that kind of thing.

Senator SALTONSTALL. Thank you, Mr. Chairman.

POSSIBILITY OF ONLY ONE GOVERNMENT REPRESENTATIVE ON BOARD

Senator JOHNSON. Mr. Secretary, the draft of this legislation presupposes a "get along" policy which I think is very optimistic. I just wonder if you feel that under the language of the bill as now drawn, it would be possible to have only one representative of the Government on this Board?

Mr. QUARLES. I thought I remembered the language to say that 8 of the members would be from the Government, but 1——

Senator JOHNSON. It says no more than 8, and it says at least 1 must be from the Department of Defense. Now, I could appoint Secretary Quarles and he wouldn't be more than eight. He might be equal to 8 but he wouldn't be more than 8.

Mr. QUARLES. I would have to agree to that.

Senator JOHNSON. And I wouldn't have to go to any other department. And then I could get 16 retired vice presidents to come in and join him and they would all give advice to a director 4 times a year that he didn't have to take. I just wondered if you want to leave as your testimony in the record that that is the kind of arrangement you recommend as the most desirable for Congress to write into permanent law. You have been a pretty careful, prudent fellow and it seems to me that we have been talking about boards and advisory committees, you know, for the last 6 or 7 months around here and it has got us into some of this trouble. I thought that maybe this reorganization indicated that we were going to try to centralize some authority along with responsibility and improve on some of these techniques that we had found didn't work too well. I think we are going to have to be fish or fowl. I think we are either going to have to have a board with some authority, a commission, that says here is what you can do and what you can't do, and here is what your function is, or we are going to turn it over to existing agencies, or some specific agency, where authority and responsibility go together.

I am terribly concerned about this general arrangement of advisers to advisers to advisers—maybe none of them responsible to anybody except the company that they have worked for or to their own conscience or maybe temporarily to someone who might recommend them.

But it seems to me that, under this language, it is possible to have 16 men from private life and 1 representative from the Department of Defense.

Now, is that a fair construction of the language as you read it? You have a very able counsel there with you and I would like to see if he concurs with that observation.

Mr. QUARLES. Well, on advice of counsel I do agree that that is a fair construction of the words as they stand, Mr. Chairman, and I think I have to say that, endorsing the words as they stand, I was taking for granted the kind of Chief Executive wisdom and judgment in making these appointments that it has been—at least within my own experience that I have always seen, and I think it is fair to say that one must couple Executive wisdom with the words of law to produce a good result in this case.

Senator JOHNSON. And it has been your observation that the Chief Executive has always been wise in matters of this kind. You wouldn't confine it to just one Executive?

Mr. QUARLES. No.

Senator JOHNSON. From all your experience you think he can succeed in doing this. You never have seen a Chief Executive repose a confidence in someone and be betrayed. You would feel that it would be good public policy if 16 came from outside the Government and only 1 from the Government, and that could happen under this law. I just don't believe that you feel that way.

Mr. QUARLES. I think I have to admit, Mr. Chairman, that it would be possible to make 16 nongovernmental appointments and that it would not be good public policy.

Senator JOHNSON. Well, don't you think, then, that we ought to be careful in what we write to be sure that we do make good public policy?

Mr. QUARLES. Yes, indeed, sir; I have no question about that.

Senator JOHNSON. And that would indicate some sort of an amendment here that would require a specific number coming from the Government without just leaving the proposition open.

Mr. QUARLES. I can see the advantage of doing that; yes, sir.

Senator SALTONSTALL. Would the chairman yield for a question on that, following up what he has just said?

Senator JOHNSON. Yes, Senator.

Senator SALTONSTALL. I thank the chairman.

USFULNESS OF ADVISORY COMMITTEES

Mr. Quarles, you have been an executive in the Department of Defense now for 4 or 5 years and you are very much respected by Congress. You are respected as a researcher and as an honorable and high-class man and one of independent judgment.

Now, you have a great many advisory committees over there. Have you ever gone against their advice?

Mr. QUARLES. Oh, yes, we have gone against the advice of advisory committees, but I would say that we have never gone against the

advice of an advisory committee within my knowledge except where there were substantial outside considerations that the advisory committee didn't have access to.

Senator SALTANSTALL. Are you a believer in advisory committees which have no authority of operation and no authority to require their advice to be followed?

Mr. QUARLES. I am a believer in such advisory committees, particularly in the area of advising about potentialities of science in various fields.

Senator JOHNSON. Along the lines of the Gaither Committee?

Mr. QUARLES. Yes, sir. I think committees of that kind are very valuable.

Senator JOHNSON. I would be curious to know whether you are carrying out their program. I have never been sure what it was.

Have you concluded, Senator Saltonstall? Do you wish to ask more questions?

Senator SALTONSTALL. No.

Senator JOHNSON. Senator Anderson?

Senator ANDERSON. Just one here.

You mentioned the aeronautical research by NACA. Now, the name—the organization is the National Advisory——

Senator JOHNSON. Senator Anderson, pardon me, I may have been a little unfair to Senator Bricker. I yielded to Senator Saltonstall, and then I should have called on Senator Bricker.

Senator BRICKER. That is all right.

Senator JOHNSON. Thank you, Senator Bricker.

Senator Anderson.

FUNCTION OF THE NACA

Senator ANDERSON. The National Advisory Committee for Aeronautics—a man who has been over there a long time told me that in 30 years he had never seen any advice from the Advisory Committee. He had seen the results of experiment and some very fine work in carrying out research that had been directed to it.

Now, you were in the Air Force. You have been, as Senator Saltonstall said, many years in there in the Department of Defense. Have you ever received any advice, not experimental work, but advice from the Advisory Committee for Aeronautics?

Mr. QUARLES. I would have to say that from the Committee as such we have never received advice that one would distinguish from the advice that you would draw from the results of their experiments.

This is a kind of fine distinction, but I think it is fair to say that we would not today label that as an Advisory Committee if we were finding the best and most appropriate label for it.

Senator ANDERSON. I appreciate that answer. It is a sort of difficult question, but this individual was very sure that no advice as such had been received. They can be given a problem and will come back with a good answer.

INTERNATIONAL COOPERATION

I asked General Doolittle yesterday about international cooperation because he had felt, I am sure, that it is possible to have international cooperation.

Now, the chairman of this committee made a very fine speech in the Senate dealing with this international use of outer space. The Vice President followed a few days later—perhaps a few days earlier, but I think a few days later—I am not trying to knock the Vice President—with another fine statement about the international use of space, and I said to Dr. Doolittle, what section of the bill permits international cooperation on space activities?

He replied, there is none. I couldn't find one. I read and reread the bill. Can you find one?

Mr. QUARLES. Well, I certainly thought there was one, but again, after your statement, Senator Anderson, I feel very hesitant.

Senator ANDERSON. I am not sure. I may not understand the bill.

Mr. QUARLES. Well, on page 2 under——

Senator ANDERSON. May I find it together with you?

Mr. QUARLES. Under 6, where you are dealing with the policy objectives of the act, and I admit these are not defined as functions, but they are defined as policy objectives of the act under section 2 (6), line 22, you do have the phrase—

> cooperation by the United States with other nations and groups of nations in work done pursuant to this Act and in the peaceful application of the results thereof—

and I construed that as setting a broad national policy of such cooperation.

Senator ANDERSON. Well, we are trying to find out what the legislative intent is and this is helpful. Do you think that permits the setting up of an international laboratory on space?

Mr. QUARLES. I would think that this permitted the setting up of an international laboratory in this country with others participating, or participation of this agency in another country, all, of course, within certain security limitations that might have to be imposed.

LOPER COMMITTEE

Senator ANDERSON. One final question. You must make due allowance for my excessive zeal on nuclear propulsion——

Senator JOHNSON. I am having a little difficulty following you. I am very much interested in this point.

Senator ANDERSON. I was saying I have to apologize in advance for my unusual preoccupation with nuclear propulsion, but you spoke about the use of advisory committees and the rejection of reports of advisory committees. Don't we both recall the Loper Committee and its advice on the use of nuclear power, and the rejection of that by the man who was down here from Standard Oil of New Jersey before the report was even received?

Mr. QUARLES. What committee was that?

Senator ANDERSON. Loper—General Loper.

Mr. QUARLES. I don't believe I can identify that point. This has to do with application of nuclear power to aircraft propulsion?

Senator ANDERSON. It is still classified. So I wouldn't want you to comment on the recommendations. But the man who was down here in charge of that particular activity from Standard Oil of New Jersey had information as to the contents of the report and he rejected it before it was even received.

Mr. QUARLES. I do now recall the matter you referred to, Senator Anderson, and it is difficult to discuss under these circumstances.

Senator ANDERSON. Mr. Secretary, I wouldn't ask you to at all, if it is. You and I have been friends too long.

Senator JOHNSON. Senator Anderson, would you yield to me?

Senator ANDERSON. Yes.

DEFINITION OF "SCIENTIFIC COMMUNITY"

Senator JOHNSON. Mr. Secretary, did I understand, in response to a question from the Senator from New Mexico, that you relied on line 22, section 2 (6), of the policy declaration for your authority for international cooperation?

Mr. QUARLES. Now, that was the only one, Mr. Chairman, that I spotted quickly, and I admitted that it was a general policy statement rather than a definition of function of the new Agency, but, again, in my layman fashion, I had read this as implying clearly that the new Agency would be guided by such policy.

Senator JOHNSON. To me, it is nothing more than a policy statement, an expression of a pious hope that this will be the case. I want to know if there is any other language in the bill that you think vests such authority.

Mr. QUARLES. My impression is that there is not, but may I answer that for the record, Mr. Chairman?

Senator JOHNSON. Yes; but I would like to call your attention, if that is your impression, to line 3 of page 6 of the bill, and, for the benefit of the committee members who may not have a copy before them, I want to read paragraph 4. Perhaps I had better go back to line 17 on page 5, section 6.

> The agency shall (4) arrange for participation by the scientific community in planning scientific measurements observations to be made through use of aeronautical and space vehicles and conduct or arrange for the conduct of such measurements and observations, and provide, as appropriate, for dissemination of data collected.

Now, would that, in your opinion, be confined in language to this country, or would that be of a worldwide nature?

Mr. QUARLES. Mr. Chairman, I think it would be the scientific community; unless limited more than it is here, it would be worldwide rather than national.

Senator JOHNSON. And if it were worldwide, then you do have specific authority; is that correct?

Mr. QUARLES. I agree, Mr. Chairman, and I appreciate your correction, because I haven't had a chance, in answer to Senator Anderson's question, to scan the act fully. I certainly had thought earlier that it did carry with it explicit direction for international cooperation.

Senator JOHNSON. Now, that is very encouraging, and I want to add a few words of caution. I would hope that you would find an opportunity to carefully review the provision of paragraph 4 on page 6 and supply the committee with a memorandum in keeping with the interpretation that you have just made, if, after reflection and study, that is your construction of paragraph 4. If, on the other hand, it is limited solely to this country, I would like to say so because I think it is very important that we make it abundantly clear what we mean

by that paragraph. And I think it is even more important that we determine what, if anything, the administration recommends in this regard.

(See end of testimony.)

Senator MUNDT. Would the chairman yield?

Senator JOHNSON. Yes. If anyone wants to ask a question, he may. I have a problem on the floor shortly. I yield to the Senator from South Dakota.

LANGUAGE OF SECTION ON INTERNATIONAL COOPERATION

Senator MUNDT. Back to section 2 (6) on page 2, Mr. Quarles, as I read it in conjunction with what the distinguished chairman has been saying, it seems to me that this language, "cooperation by the United States with other nations and groups of nations in work done pursuant to this Act and in the peaceful application of the results thereof," either says too much or too little. It is a wide-open statement which I would like to have the chairman include in his request for a memorandum as to what there was proposed to do under this subsection (6) on page 2 as well as the others.

Senator JOHNSON. I would be very happy to have the Secretary comply with the request of the Senator from South Dakota, and, while he is doing that, I wonder if he doesn't want to give thought to changing the word "and" to "for" on line 24 of the draft. The Senator from Massachusetts has called that to my attention.

Mr. QUARLES. Change the word "and" to "for"?

Senator JOHNSON. It would read:

cooperation by the United States with other nations and groups of nations in work done pursuant to this Act for the peaceful application of the results thereof.

The Senator from Massachusetts suggested that wording and suggests you strike the word "and" and substitute "for" for it. I wanted to get your reaction.

Mr. QUARLES. I will be glad to give my reaction.

Senator JOHNSON. If the committee would give me permission to do so, I would like to ask Senator Anderson to preside. We had anticipated asking Dr. Waterman to appear at 11:30, and we expect to come back at 2:30 and resume, and then return at 10:30 tomorrow morning. But, unfortunately for me, and perhaps fortunately for the committee, I have duties elsewhere that I must perform.

Senator BRICKER. Mr. Chairman.

Senator ANDERSON (now presiding). Yes, Senator Bricker.

Senator BRICKER. I would just like to make one suggestion here. I think, if we want international cooperation for peaceful uses of the Space Agency, it ought to be definitely pointed out that the power granted is an express grant rather than in the general outline of purposes, and yet I might suggest the Supreme Court of the United States has, in the preeminent Constitution, a grant of power in the welfare clause, so this is just as close to a grant of power as that is.

Senator ANDERSON. I thank Senator Bricker for that. I think it adds a point to what the General Counsel said a while ago about this AEC Act. Senator Bricker sat there day by day as they discussed these and other provisions.

Thank you, Mr. Quarles, very much, for your fine, frank statement which we appreciate, as we always do.

Mr. QUARLES. Thank you very much.

(The material for the record, supplied by Mr. Quarles, is as follows:)

THE DEPUTY SECRETARY OF DEFENSE,
Washington, D. C., May 19, 1958.

Hon. LYNDON B. JOHNSON,
Chairman, Select Committee on Space and Astronautics,
United States Senate.

DEAR MR. CHAIRMAN: This is in response to requests made during the course of my testimony on May 7, 1958 before the Select Committee on Space and Astronautics for certain additional information.

My views were requested as to whether it is preferable to change the wording of section 2, lines 4 through 10 of S. 3609 or whether it is better to establish the intent by legislative history. As a general principle, I certainly agree that the preferred course is to have the wording of the legislation set forth in sufficient clarity so that the need to make interpretations will be held to a minimum. In a letter dated May 12, to you, Mr. Decher, our General Counsel, submitted language which would remove any doubt in this area by clearly providing that the activities peculiar to or primarily associated with weapons systems or military operations will be the responsibility of the Department of Defense.

With respect to section 6 (b) (4) dealing with gifts or donations to the proposed agency, I am advised by the Bureau of the Budget that this provision follows comparable authority given to the National Science Foundation and the Bureau of Standards, thus providing a means by which public-spirited individuals or organizations may assist in furthering the purposes of the proposed legislation.

Regarding international cooperation, I read section 2 (6) as defining national objectives and not necessarily the functions of the new agency. For example, it seems unlikely that cooperation with "other nations and groups of nations" would be carried out directly by NASA, except to the extent that the State Department had established channels for such cooperation. There would appear to be no need in the statement of policy to extend point (6) to include cooperation with individuals and groups in other nations, since this is implicit in cooperation "by the United States with other nations." The "work done pursuant to this Act and in the peaceful application of the results thereof" is interpreted to be work of an unclassified scientific character and not to include national secrets either of a military or an atomic energy kind.

I believe that section 6 (a) (4) gives specific authority to the agency to participate in scientific experiments through the "scientific community." I construe "scientific community" to mean all scientists interested in research in this particular field and/or organizations representing such scientists. "Scientific community" would be therefore, international in extent unless otherwise restricted.

Since the new space agency would be primarily concerned with research in the aeronautical and space sciences and not with those applications of military significance, the data which the Director of the space agency would disseminate would presumably be unclassified data. Whether the new space agency would disseminate such data to other nations and foreign nationals directly or through one of the existing agencies for such dissemination could be properly left for executive branch determination. It is anticipated that any classified information would be handled in accordance with existing procedures.

I am attaching hereto a statement with respect to the handling of patents.

Sincerely yours,

DONALD A. QUARLES.

PATENTS

With respect to patents, the proposed new agency would be governed by existing laws and regulations.

As to Government employees, which would of course include employees of the proposed agency, Executive Order 10096, copy attached, relating to patent policy is applicable. By this order, the Government obtains title when, under the policy enunciated in the order, the Government has a paramount interest; but where the equities of the employee are greater than those of the Government, the employee retains the title but the Government receives an irrevocable royalty-free license for its own use. We have found in the Department of Defense that a license to the Government preserves all necessary rights; and leaving title with the employee so that he can receive any benefits from nongovernmental commercial use provides an incentive to employees to make inventions.

As to contractors, the Department of Defense in the Armed Services Procurement Regulation (the pertinent section is attached) requires the inclusion in contracts for research and development of a patent-rights clause which permits

the contractor to retain the title to the invention but gives the Government an irrevocable royalty-free license throughout the world. Again, as noted in the employee's inventions this provides the Government all the rights it needs and leaves an incentive to the contractor.

With respect to secrecy of patents, the Patent Secrecy Act (35 U. S. C. 181 et seq.), provides adequate authority to withhold the issuing of patents falling within the classified area.

We are advised that the NACA policy and procedures on patent matters are similar to those of the Department of Defense. The above authority and procedures have provided an adequate basis for the handling of patent matters relating to Department of Defense problems not only in the area of advanced research and missilry but in other important areas well. Therefore, it would appear that special patent provisions are not required in the proposed legislation.

TITLE 3—THE PRESIDENT

Executive Order 10096

PROVIDING FOR A UNIFORM PATENT POLICY FOR THE GOVERNMENT WITH RESPECT TO INVENTIONS MADE BY GOVERNMENT EMPLOYEES AND FOR THE ADMINISTRATION OF SUCH POLICY

Whereas inventive advances in scientific and technological fields frequently result from governmental activities carried on by Government employees; and

Whereas the Government of the United States is expending large sums of money annually for the conduct of these activities; and

Whereas these advances constitute a vast national resource; and

Whereas it is fitting and proper that the inventive product of functions of the Government, carried out by Government employees, should be available to the Government; and

Whereas the rights of Government employees in their inventions should be recognized in appropriate instances; and

Whereas the carrying out of the policy of this order requires appropriate administrative arrangements:

Now, therefore, by virtue of the authority vested in me by the Constitution and statutes, and as President of the United States and Commander in Chief of the armed forces of the United States, in the interest of the establishment and operation of a uniform patent policy for the Government with respect to inventions made by Government employees, it is hereby ordered as follows:

1. The following basic policy is established for all Government agencies with respect to inventions hereafter made by any Government employee:

(a) The Government shall obtain the entire right, title and interest in and to all inventions made by any Government employee (1) during working hours, or (2) with a contribution by the Government of facilities, equipment, materials, funds, or information, or of time or services of other Government employees on official duty, or (3) which bear a direct relation to or are made in consequence of the official duties of the inventor.

(b) In any case where the contribution of the Government, as measured by any one or more of the criteria set forth in paragraph (a) last above, to the invention is insufficient equitably to justify a requirement of assignment to the Government of the entire right, title and interest to such invention, or in any case where the Government has insufficient interest in an invention to obtain entire right, title and interest therein (although the Government could obtain some under paragraph (a), above), the Government agency concerned, subject to the approval of the Chairman of the Government Patents Board (provided for in paragraph 3 of this order and hereinafter referred to as the Chairman), shall leave title to such invention in the employee, subject, however, to the reservation to the Government of a non-exclusive, irrevocable, royalty-free license in the invention with power to grant licenses for all governmental purposes, such reservation, in the terms thereof, to appear, where practicable, in any patent domestic or foreign, which may issue on such invention.

(c) In applying the provisions of paragraphs (a) and (b), above, to the facts and circumstances relating to the making of any particular invention, it shall be presumed that an invention made by an employee who is employed or assigned (i) to invent or improve or perfect any art, machine, manufacture, or composition of matter, (ii) to conduct or perform research, development work, or both,

(iii) to supervise, direct, coordinate, or review Government financed or conducted research, development work, or both, or (iv) to act in a liaison capacity among governmental or nongovernmental agencies or individuals engaged in such work, or made by an employee included within any other category of employees specified by regulations issued pursuant to section 4 (b) hereof, falls within the provisions of paragraph (a), above, and it shall be presumed that any invention made by any other employee falls within the provisions of paragraph (b), above. Either presumption may be rebutted by the facts or circumstances attendant upon the conditions under which any particular invention is made and, notwithstanding the foregoing, shall not preclude a determination that the invention falls within the provisions of paragraph (d) next below.

(d) In any case wherein the Government neither (1) pursuant to the provisions of paragraph (a) above, obtains entire right, title and interest in and to an invention nor (2) pursuant to the provisions of paragraph (b) above, reserves a nonexclusive, irrevocable, royalty-free license in the invention with power to grant licenses for all governmental purposes, the Government shall leave the entire right, title and interest in and to the invention in the Government employee, subject to law.

(e) Actions taken, and rights acquired, under the foregoing provisions of this section, shall be reported to the Chairman in accordance with procedures established by him.

2. Subject to considerations of national security, or public health, safety, or welfare, the following basic policy is established for the collection, and dissemination to the public, of information concerning inventions resulting from Government research and development activities:

(a) When an invention is made under circumstances defined in paragraph 1 (a) of this order giving the United States the right to title thereto, the Government agency concerned shall either prepare and file an application for patent therefor in the United States Patent Office or make a full disclosure of the invention promptly to the Chairman, who may, if he determines the Government interest so requires, cause application for patent to be filed or cause the invention to be fully disclosed by publication, thereof: *Provided, however,* That, consistent with present practice of the Department of Agriculture, no application for patent shall, without the approval of the Secretary of Agriculture, be filed in respect of any variety of plant invented by any employee of that Department.

(b) Under arrangements made and policies adopted by the Chairman, all inventions or rights therein, including licenses, owned or controlled by the United States or any Government agency shall be indexed, and copies, summaries, analyses and abstracts thereof shall be maintained and made available to all Government agencies and to public libraries, universities, trade associations, scientists and scientific groups, industrial and commercial organizations, and all other interested groups of persons.

3. (a) A Government Patents Board is established consisting of a Chairman of the Government Patents Board, who shall be appointed by the President, and of one representative from each of the following:

Department of Agriculture
Department of Commerce
Department of the Interior
Department of Justice
Department of State
Department of Defense
Civil Service Commission
Federal Security Agency
National Advisory Committee for Aeronautics
General Services Administration

Each such representative, together with an alternate, shall be designated by the head of the agency concerned.

(b) The Government Patents Board shall advise and confer with the Chairman concerning the operation of those aspects of the Government's patent policy which are affected by the provisions of this order or of Executive Order No. 9865, and suggest modifications or improvements where necessary.

(c) Consonant with law, the agencies referred to in paragraph 3 (a) hereof shall as may be necessary for the purpose of effectuating this order furnish assistance to the Board in accordance with section 214 of the Independent Offices Appropriation Act, 1946, 59 Stat. 134, 31 U. S. C. 691. The Department of Commerce shall provide necessary office accommodations and facilities for the use of the Board and the Chairman.

(d) The Chairman shall establish such committees and other working groups as may be required to advise or assist him in the performance of any of his functions.

(e) The Chairman of the Government Patents Board and the Chairman of the Interdepartmental Committee on Scientific Research and Development (provided for by Executive Order No. 9912 of December 24, 1947) shall establish and maintain such mutual consultation as will effect the proper coordination of affairs of common concern.

4. With a view to obtaining uniform application of the policies set out in this order and uniform operations thereunder, the Chairman is authorized and directed:

(a) To consult and advise with Government agencies concerning the application and operation of the policies outlined herein;

(b) After consultation with the Government Patents Board, to formulate and submit to the President for approval such proposed rules and regulations as may be necessary or desirable to implement and effectuate the aforesaid policies, together with the recommendations of the Government Patents Board thereon;

(c) To submit annually a report to the President concerning the operation of such policies, and from time to time such recommendations for modification thereof as may be deemed desirable;

(d) To determine with finality any controversies or disputes between any Government agency and its employees, to the extent submitted by any party to the dispute, concerning the ownership of inventions made by such employees or rights therein; and

(e) To perform such other or further functions or duties as may from time to time be prescribed by the President or by statute.

5. The functions and duties of the Secretary of Commerce and the Department of Commerce under the provisions of Executive Order No. 9865 of June 14, 1947 are hereby transferred to the Chairman and the whole or any part of such functions and duties may be delegated by him to any Government agency or officer: *Provided*, That said Executive Order No. 9865 shall not be deemed to be amended or affected by any provision of this Executive order other than this paragraph 5.

6. Each Government agency shall take all steps appropriate to effectuate this order, including the promulgation of necessary regulations which shall not be inconsistent with this order or with regulations issued pursuant to paragraph 4 (b) hereof.

7. As used in this Executive order, the next stated terms, in singular and plural, are defined as follows for the purposes hereof:

(a) "Government agency" includes any executive department and any independent commission, board, office, agency, authority, or other establishment of the Executive Branch of the Government of the United States (including any such independent regulatory commission or board, any such wholly-owned corporation, and the Smithsonian Institution), but excludes the Atomic Energy Commission.

(b) "Government employee" includes any officer or employee, civilian or military, of any Government agency, except such part-time consultants or employees as may be excluded by regulations promulgated pursuant to paragraph 4 (b) hereof.

(c) "Invention" includes any art, machine, manufacture, design, or composition of matter, or any new and useful improvement thereof, or any variety of plant, which is or may be patentable under the patent laws of the United States.

HARRY S. TRUMAN

THE WHITE HOUSE,
January 23, 1950.

[F. R. Doc. 50-722; Filed, Jan. 23, 1950; 1:16 p. m.]

SECTION IX—PATENTS, DATA, AND COPYRIGHTS

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SECTION IX

PATENTS, DATA, AND COPYRIGHTS

9–000 Scope of Section. This Section sets forth policies, instructions, and contract clauses pertaining to patents, data, and copyrights in connection with the procurement of supplies and services.

Part 1—Patents

9–100 Scope of Part. This part prescribes contract clauses and instructions which define and implement the policy of the Department of Defense with respect to—

(i) Inventions relating to experimental, developmental, or research work performed under Government contracts.

(ii) Patent infringement liability resulting from work performed under Government contracts.

(iii) Patent royalties payable in connection with the performance of Government contracts.

(iv) Security requirements covering patent applications containing classified subject matter filed by contractors.

9–101 Reserved.

9–102 Authorization and Consent.

(a) Under 28 U. S. Code 1498, any suit for infringement of a patent based on the manufacture or use of a patented invention for the Government by a contractor or by a subcontractor (including lower-tier subcontractors) can be maintained only against the Government in the Court of Claims, and not against the contractor or subcontractor, in those cases where the Government has authorized or consented to the manufacture or use of the patented invention. Accordingly, in order that work by a contractor or subcontractor under a Government contract may not be enjoined by reason of patent infringement, authorization and consent shall be given as herein provided. The liability of the Government for damages in any such suit against it may, however, ultimately be borne by the contractor or subcontractor in accordance with the terms of any patent indemnity clause also included in the contract, and an authorization and consent clause does not detract from any patent indemnification commitment by the contractor or subcontractor. Therefore, both a patent indemnity clause and an authorization and consent clause may be included in the same contract.

(b) An authorization and consent clause shall not be used in contracts where both performance and delivery are to be outside the United States, its Territories, its possessions, or Puerto Rico, unless the contract indicates that the supplies are ultimately to be shipped into the United States, its Territories, its possessions, or Puerto Rico, in which case the instructions of ASPR 9–102.1 and 9–102.2 are applicable.

9–102.1 Authorization and Consent in Contracts for Supplies. The contract clause set forth below may be included in all contracts for supplies (including construction work), except that it shall not be used:

(i) when prohibited by ASPR 9–102 (b); or

(ii) in contracts exclusively for experimental, developmental, or research work which are subject to the provisions of ASPR 9–102.2.

AUTHORIZATION AND CONSENT

The Government hereby gives its authorization and consent (without prejudice to its rights of indemnification, if such rights are provided for in this contract) for all use and manufacture, in the performance of this contract or any part hereof or any amendment hereto or any subcontract hereunder (including any lower-tier subcontract), of any patented invention (i) embodied in the structure or composition of any article the delivery of which is accepted by the Government under this contract, or (ii) utilized in the machinery, tools, or methods the use of which necessarily results from compliance by the Contractor or the using subcontractor with (a) specifications or written provisions now or hereafter forming a part of this contract, or (b) specific written instructions given by the Contracting Officer directing the manner of performance. The Contractor's entire liability to the Government for patent infringement shall be determined solely by the provisions of the indemnity clause, if any, included in the contract and the Government assumes liability for all other infringement to the extent of the authorization and consent hereinabove granted.

9–102.2 Authorization and Consent in Contracts for Research or Development. Greater latitude in the use of patented inventions is to be allowed in a contract for experimental, developmental, or research work than in a contract for supplies. Unless prohibited by ASPR 9–102 (b), the clause set forth below shall be included in all contracts calling exclusively for experimental, developmental, or research work, and may be included in contracts calling for both supplies and experimental, developmental, or research work. If the clause set forth below is included in a contract, the clause in ASPR 9–102.1 shall not be included.

AUTHORIZATION AND CONSENT

The Government hereby gives its authorization and consent for all use and manufacture of any patented invention in the performance of this contract or any part hereof or any amendment hereto or any subcontract hereunder (including any lower-tier subcontract).

9–103 Patent Indemnification of Government by Contractor. In order that the Government may be reimbursed for liability for patent infringement arising out of or resulting from the performance of construction contracts or contracts for supplies which normally are or have been sold or offered for sale to the public in the commercial open market, or which are the same as such supplies with a relatively minor modification thereof, clauses providing for indemnification of the Government are to be included in such contracts in accordance with the instructions preceding the clauses set forth below. A patent indemnity clause shall not be used in contracts under the following circumstances:

(i) where the contract is for supplies which clearly are not or have not been sold or offered for sale to the public in the commercial open market. However, even in the foregoing instance, a patent indemnity clause may be included where (A) in the case of contracts to be awarded by formal advertising it is desired to obtain an indemnity

as to components and spare parts so sold or offered for sale, in which case the clause in ASPR 9–103.2 may be used; or (B) in the case of contracts to be awarded either by formal advertising or negotiation, a patent owner contends that the prospective procurement would infringe his patent and the low bidder or offeror is willing to indemnify the Government as to such patent without increase in price on the basis that the patent is invalid or not infringed, or for other good reasons; or

(ii) where both performance and delivery are to be outside the United States, its Territories, its possessions, or Puerto Rico, unless the contract indicates that the supplies are ultimately to be shipped into the United States, its Territories, its possessions, or Puerto Rico, in which case the instructions of ASPR 9–103.1, 9–103.2, or 9–103.3 are applicable; or

(iii) where the contract is for an amount of $5,000 or less, except that, as a matter of administrative convenience, the clause need not be deleted where it is a part of a standard form being used for contracts of $5,000 or less, since it is self-deleting as to such contracts.

9–103.1 Patent Indemnification in Formally Advertised Contracts—Commercial Status Predetermined.

(a) Except as prohibited by ASPR 9–103, the clause set forth below is appropriate in formally advertised construction contracts and shall be included in formally advertised contracts for supplies when it has been determined in advance of issuing the invitation for bids that the supplies (or such supplies apart from relatively minor modifications to be made thereto) normally are or have been sold or offered for sale by any supplier to the public in the commercial open market.

PATENT INDEMNITY (PREDETERMINED)

If the amount of this contract is in excess of $5,000, the Contractor shall indemnify the Government and its officers, agents, and employees against liability, including costs, for infringement of any United States letters patent (except letters patent issued upon an application which is now or may hereafter be kept secret or otherwise withheld from issue by order of the Government) arising out of the manufacture or delivery of supplies or out of construction, alteration, modification, or repair of real property (hereinafter referred to as "construction work") under this contract, or out of the use or disposal by or for the account of the Government of such supplies or construction work. The foregoing indemnity shall not apply unless the Contractor shall have been informed as soon as practicable by the Government of the suit or action alleging such infringement, and shall have been given such opportunity as is afforded by applicable laws, rules, or regulations to participate in the defense thereof; and further, such indemnity shall not apply if: (i) the infringement results from compliance with specific written instructions of the Contracting Officer directing a change in the supplies to be delivered or in the materials or equipment to be used, or directing a manner of performance of the contract not normally used by the Contractor; or (ii) the infringement results from the addition to, or change in, the supplies furnished or construction work performed, which addition or change was made subsequent to delivery or performance by the Contractor; or (iii) the claimed infringement is settled without the consent of the Contractor, unless required by final decree of a court of competent jurisdiction.

(b) Certain supply contracts call only in part for items which normally are or have been sold or offered for sale by any supplier to the public in the commercial open market, or such items with relatively minor modifications. For the purpose of excluding from patent indemnification such specific items as normally are not or have not been sold or offered for sale by any supplier to the public in the commercial open market, the following sentence may be added to the end of the clause set forth in (a) above:

"The foregoing shall not apply to the following contract items:

(List the items to be excluded)"

9–103.2 Patent Indemnification in Formally Advertised Contracts—Commercial Status Not Predetermined. Except as prohibited by ASPR 9–103, the clause set forth below is appropriate in (i) formally advertised construction contracts and (ii) formally advertised contracts for supplies or component parts thereof when it is not determined in advance of issuing the invitation for bids that such supplies or component parts (or such supplies or component parts apart from relatively minor modifications to be made thereto) normally are or have been sold or offered for sale by any supplier to the public in the commercial open market:

PATENT INDEMNITY (NOT PREDETERMINED)

If the amount of this contract is in excess of $5,000, the Contractor shall indemnify the Government and its officers, agents, and employees against liability, including costs, for infringement of any United States letters patent (except letters patents issued upon an application which is now or may hereafter be kept secret or otherwise withheld from issue by order of the Government) arising out of the manufacture or delivery of supplies or component parts thereof, or out of construction, alteration, modification, or repair of real property (hereinafter referred to as "construction work") under this contract, or out of the use or disposal by or for the account of the Government, of such supplies, construction work, or component parts thereof, which supplies of component parts either normally are or have been sold or offered for sale to, and which construction work normally is of a type performed for, the public in the commercial open market by any supplier on or before the date set for opening of bids, or are such supplies, construction work, or component parts thereof, with relatively minor modifications made thereto. The foregoing indemnity shall not apply unless the Contractor shall have been informed as soon as practicable by the Government of the suit or action alleging such infringement, and shall have been given such opportunity as is afforded by applicable laws, rules, or regulations to participate in the defense thereof; and further, such indemnity shall not apply if: (i) the infringement results from compliance with specific written instructions of the Contracting Officer directing a change in the supplies to be delivered or in the materials or equipment to be used, or directing a manner of performance of the contract not normally used by the Contractor; or (ii) the infringement results from addition to, or change in, such supplies or components furnished or construction work performed which addition or change was made subsequent to delivery or performance by the Contractor; or (iii) the claimed infringement is settled without the consent of the Contractor, unless required by final decree of a court of competent jurisdiction.

9–103.3 Patent Indemnification in Negotiated Contracts. A patent indemnity clause is not required to be included in negotiated contracts, but may be included in negotiated construction contracts and, except as otherwise authorized in ASPR 9–103 (i) (B), may be included in negotiated contracts for supplies only where such supplies normally are or have been sold or offered for sale *by the contractor* to the public in the commercial open market, or are such supplies with relatively minor modifications made thereto. Ordinarily, it should be quite feasible for the contracting officer to determine, in consultation with the contractor, whether the supplies being purchased normally are on sale or have been sold or offered for sale *by the contractor* to the public in the commercial open market.

(a) Subject to the foregoing and to the prohibitions in ASPR 9–103, the clause set forth in ASPR 9–103.1 (a) is approved for use in negotiated contracts for construction work or supplies. ←

(b) Certain supply contracts call only in part for items which normally are or have been sold or offered for sale *by the contractor* to the public in the commercial open market, or such items with relatively minor modifications. For the purpose of excluding from patent indemnification such specific items as normally are not or have not been sold or offered for sale *by the contractor* to the public in the commercial open market, the following sentence may be added to the end of the clause approved for use in (a) above:

"The foregoing shall not apply to the following contract items:

(List the items to be excluded)"

9–103.4 Waiver of Indemnity by the Government. In the event that it is desired to exempt one or more specified United States patents from the indemnification provisions of the preceding clauses, authority shall first be obtained from the Secretary of the Military Department concerned or his authorized representative, and the following clause shall be included in the contract, in addition to the patent indemnity clause: ←

WAIVER OF INDEMNITY

Any provision of this contract to the contrary notwithstanding, the Government hereby authorizes and consents to the use and manufacture, solely in the performance of this contract, of any invention covered by the United States patents identified and listed below, and waives indemnification by the Contractor with respect to such patents: (Identify the patents by number or by other means if more appropriate)

9–104 Notice and Assistance. The Government should be notified by the contractor of all claims of infringement in connection with the performance of a Government contract which come to the contractor's attention. The contractor should also assist the Government, to the extent of information and evidence in the possession of the contractor, in connection with patent litigation arising out of or resulting from the performance of the contract. Accordingly, the clause set forth below shall be included in all contracts in excess of $5,000 for supplies, construction, or experimental, developmental, or research work; except that it shall not be included in contracts—

(i) where both performance and delivery are to be outside the United States, its Territories, its possessions, or Puerto Rico, unless the contract indicates that the supplies are ultimately to be shipped into the United States, its Territories, its possessions, or Puerto Rico; or,

(ii) of lesser amounts, except that as a matter of administrative convenience, the clause need not be deleted when it is a part of a standard form being used for contracts of $5,000 or less, since it is self-deleting as to such contracts:

NOTICE AND ASSISTANCE REGARDING PATENT INFRINGEMENT

The provisions of this clause shall be applicable only if the amount of this contract is in excess of $5,000.

(a) The Contractor shall report to the Contracting Officer, promptly and in reasonable written detail, each notice or claim of patent infringement based on the performance of this contract of which the Contractor has knowledge.

(b) In the event of litigation against the Government on account of any claim of patent infringement arising out of the performance of this contract or out of the use of any supplies furnished or work or services performed hereunder, the Contractor shall furnish to the Government, upon request, all evidence and information in possession of the Contractor pertaining to such litigation. Such evidence and information shall be furnished at the expense of the Government except in those cases in which the Contractor has agreed to indemnify the Government against the claim being asserted.

9–105 Processing of Infringement Claims. The Military Departments shall process claims for alleged unauthorized use of inventions in accordance with instructions of each respective Military Department.

9–106 Classified Contracts. Unauthorized disclosure of classified subject matter, whether in patent applications or resulting from the issuance of a patent, may be a violation of 18 U. S. Code 791 et seq. (Espionage and Censorship) and related statutes and may be contrary to the interests of

national security. Accordingly, except as otherwise provided in ASPR 9–106.1, the following clause shall be included in every classified contract and in every unclassified contract which covers or is likely to cover classified subject matter:

FILING OF PATENT APPLICATIONS

(a) Before filing or causing to be filed a patent application disclosing any subject matter of this contract, which subject matter is classified "Secret" or higher, the Contractor shall, citing the thirty (30) day provision below, transmit the proposed application to the Contracting Officer for determination whether, for reasons of national security, such application should be placed under an order of secrecy or sealed in accordance with the provisions of 35 U. S. Code 181–188 or the issuance of a patent should be otherwise delayed under pertinent statutes or regulations; and the Contractor shall observe any instructions of the Contracting Officer with respect to the manner of delivery of the patent application to the U. S. Patent Office for filing, but the Contractor shall not be denied the right to file such patent application. If the Contracting Officer shall not have given any such instructions within thirty (30) days from the date of mailing or other transmittal of the proposed application, the Contractor may file the application.

(b) The Contractor shall furnish to the Contracting Officer, at the time of or prior to the time when the Contractor files or causes to be filed a patent application disclosing any subject matter of this contract, which subject matter is classified "Confidential," a copy of such application for determination whether, for reasons of national security, such application should be placed under an order of secrecy or the issuance of a patent should be otherwise delayed under pertinent statutes or regulations.

(c) In filing any patent application coming within the scope of this clause, the Contractor shall observe all applicable security regulations covering the transmission of classified subject matter.

9–106.1 Classified Contracts To Be Performed Outside the United States. The following clause shall be included in classified contracts where the work is to be performed outside the United States, its Territories, its possessions, or Puerto Rico, regardless of the place of delivery:

FILING OF PATENT APPLICATIONS (FOREIGN)

While and so long as any subject matter of this contract is classified for reasons of security, the Contractor shall not file, or cause to be filed, in any country, an application or registration for a patent containing any of said subject matter without first obtaining written approval of the Contracting Officer.

9–107 Patent Rights Under Contracts Involving Research or Development.

9–107.1 License Rights.

(*a*) *General Rule.* Under any contract or modification thereof having experimental, developmental, or research work as one of its purposes, the Government should receive a royalty-free, nonexclusive license to practice or have practiced any inventions conceived or first actually reduced to practice in the course of performing such work or in the course of performing any prior experimental, developmental, or research work done upon the understanding in writing that a contract would be awarded. The contract cost or price should in no event be increased merely by reason of the inclusion of the Patent Rights clause set forth in paragraph (*c*) below.

(*b*) *Exclusion of Inventions From the License Grant.* Upon request of the contractor, the contracting officer shall carefully consider and may exclude from the grant in the Patent Rights clause any invention covered by a United States patent issued or application for patent filed by or on behalf of the contractor prior to the award of a contract when he finds one or more of the following circumstances to be established:

(i) the contractor has expended sums in developing the invention (as represented by research and development costs and expenses for preparing and prosecuting the patent application) which are relatively large in comparison to the amount of the proposed contract or such portion of the proposed contract amount as can be allocated in advance for the development of such an invention (in determining the sums expended by the contractor there shall be included only amounts which can be allocated to the invention which is to be excluded; such sums shall not include the entire cost of a research department or program which cannot be allocated as above provided);

(ii) the practicability of such an invention has been established as by engineering design;

(iii) the invention covers a basic material and it is not the purpose of the contract to develop such material;

(iv) the invention is useful only for military purposes and the contractor does not have facilities for furnishing the item to the Government in production quantities.

Any inventions to be excluded from the license grant by reason of the foregoing circumstances shall be specifically identified and listed in the contract Schedule.

(*c*) *Contract Clause.* The clause set forth below shall be included in every contract having as one of its purposes, experimental, developmental, or research work which is to be performed within the United States, its Territories, its possessions, or Puerto Rico. Any such contract which is to be performed outside the United States, its Territories, its possessions, or Puerto Rico, shall include a patent rights clause which may be based on the Patent Rights clause set forth below. See ASPR 16–809 for an approved form for optional use by contractors in reporting information required by paragraphs (c) (ii), (c) (iii), and (h) of the clause. In the administration of paragraph (e) of the clause, a request for conveyance of foreign rights to the Government is

not required when the contractor does not file an application for patent in a foreign country under the conditions provided in that paragraph, unless the Government intends to apply for such patent.

PATENT RIGHTS

(a) As used in this clause, the following terms shall have the meanings set forth below:

(i) The term "Subject Invention" means by invention, improvement, or discovery (whether or not patentable) conceived or first actually reduced to practice either—

(A) in the performance of the experimental, developmental, or research work called for or required under this contract; or

(B) in the performance of any experimental, developmental, or research work relating to the subject matter of this contract which was done upon an understanding in writing that a contract would be awarded;

provided that the term "Subject Invention" shall not include any invention which is specifically identified and listed in the Schedule for the purpose of excluding it from the license granted by this clause.

(ii) The term "Technical Personnel" means any person employed by or working under contract with the Contractor (other than a subcontractor whose responsibilities with respect to rights accruing to the Government in inventions arising under subcontracts set forth in (g), (h), and (i) below) who, by reason of the nature of his duties in connection with the performance of this contract, would reasonably be expected to make inventions.

(iii) The terms "subcontract" and "subcontractor" means any subcontract or subcontractor of the Contractor, and any lower-tier subcontract or subcontractor under this contract.

(b) (1) The Contractor agrees to and does hereby grant to the Government an irrevocable, nonexclusive, nontransferable, and royalty-free license to practice, and cause to be practiced by or for the United States Government, throughout the world, each Subject Invention in the manufacture, use and disposition according to law, of any article or material, and in use of any method. No license granted herein shall convey any right to the Government to manufacture, have manufactured, or use any Subject Invention for the purpose of providing services or supplies to the general public in competition with the Contractor or the Contractor's commercial licensees in the licensed fields.

(2) With respect to:

(i) any Subject Invention made by other than Technical Personnel;

(ii) any Subject Invention conceived prior to, but first actually reduced to practice in the course of, any of the experimental, developmental, or research work specified in (a) (i) above; and

(iii) the practice of any Subject Invention in foreign countries;

the obligation of the Contractor to grant a license as provided in (b) (1) above, to convey title as provided in (d) (ii) (B) or (d) (iv) below, and to convey foreign rights as provided in (e) below, shall be limited to the extent of the Contractor's right to grant the same without incurring any obligation to pay royalties or other compensation to others solely on account of said grant. Nothing contained in this Patent Rights clause shall be deemed to grant any license under any invention other than a Subject Invention.

(Contract clause continued on next page)

(c) The Contractor shall furnish to the Contracting Officer the following information and reports concerning Subject Inventions which reasonably appear to be patentable:

(i) a written disclosure promptly after conception or first actual reduction to practice of each such Invention together with a written statement specifying whether or not a United States patent application claiming the Invention has been or will be filed by or on behalf of the Contractor;

(ii) interim reports at least every twelve months, commencing with the date of this contract, each listing all such Inventions conceived or first actually reduced to practice more than three months prior to the date of the report, and not listed on a prior interim report, or certifying that there are no such unreported Inventions; and

(iii) prior to final settlement of this contract, a final report listing all such Inventions including all those previously listed in interim reports.

(d) In connection with each Subject Invention referred to in (c) (i) above, the Contractor shall do the following:

(i) if the Contractor specifies that a United States patent application claiming such Invention will be filed, the Contractor shall file or cause to be filed such application in due form and time; however, if the Contractor, after having specified that such an application would be filed, decides not to file or cause to be filed said application, the Contractor shall so notify the Contracting Officer at the earliest practicable date and in any event not later than eight months after first publication, public use or sale.

(ii) if the contractor specifies that a United States patent application claiming such Invention has not been filed and will not be filed (or having specified that such an application will be filed thereafter notifies the Contracting Officer to the contrary), the Contractor shall:

(A) inform the Contracting Officer in writing at the earliest practicable date of any publication of such Invention made by or known to the Contractor or, where applicable, of any contemplated publication by the Contractor, stating the date and identity of such publication or contemplated publication; and

(B) convey to the Government the Contractor's entire right, title, and interest in such Invention by delivering to Contracting Officer upon written request such duly executed instruments (prepared by the Government) of assignment and application, and such other papers as are deemed necessary to vest in the Government the Contractor's right, title, and interest aforesaid, and the right to apply for and prosecute patent applications covering such Invention throughout the world, subject, however, to the right of the Contractor specified in (e) below to file foreign applications, and subject further to the reservation of a non-exclusive and royalty-free license to the Contractor (and to its existing and future associated and affiliated companies, if any, within the corporate structure of which the Contractor is a part) which license shall be assignable to the successor of that part of the Contractor's business to which such Invention pertains;

(Contract clause continued on next page)

(iii) the Contractor shall furnish promptly to the Contracting Officer on request an irrevocable power of attorney to inspect and make copies of each United States patent application filed by or on behalf of the Contractor covering any such Invention;

(iv) in the event the Contractor, or those other than the Government deriving rights from the Contractor, elects not to continue prosecution of any such United States patent application filed by or on behalf of the Contractor, the Contractor shall so notify the Contracting Officer not less than sixty days before the expiration of the response period and, upon written request, deliver to the Contracting Officer such duly executed instruments (prepared by the Government) as are deemed necessary to vest in the Government the Contractor's entire right, title, and interest in such Invention and the application, subject to the reservation as specified in (d) (ii) above; and

(v) the Contractor shall deliver to the Contracting Officer duly executed instruments fully confirmatory of any license rights herein agreed to be granted to the Government.

(e) The Contractor, or those other than the Government deriving rights from the Contractor, shall have the exclusive rights to file applications on Subject Inventions in each foreign country within:

(i) nine months from the date a corresponding United States application is filed;

(ii) six months from the date permission is granted to file foreign applications where such filing had been prohibited for security reasons; or

(iii) such longer period as may be approved by the Contracting Officer.

The Contractor shall, upon written request of the Contracting Officer, convey to the Government the Contractor's entire right, title, and interest in each Subject Invention in each foreign country in which an application has not been filed within the time above specified, subject to the reservation of a nonexclusive and royalty-free license to the Contractor together with the right of the Contractor to grant sublicenses, which license and right shall be assignable to the successor of that part of the Contractor's business to which the Subject Invention pertains.

(f) If the Contractor fails to deliver to the Contracting Officer the interim reports required by (c) (ii) above, or fails to furnish the written disclosures for all Subject Inventions required by (c) (i) above shown to be due in accordance with any interim report delivered under (c) (ii) or otherwise known to be unreported, there shall be withheld from payment until the Contractor shall have corrected such failures either ten percent (10%) of the amount of this contract, as from time to time amended, or five thousand dollars ($5,000), whichever is less. After payment of eighty percent (80%) of the amount of this contract, as from time to time amended, payment shall be withheld until a reserve of either ten percent (10%) of such amount, or five thousand dollars ($5,000), whichever is less, shall have been set aside, such reserve or balance thereof to be retained until the Contractor shall have furnished to the Contracting Officer:

[Contract clause continued on next page]

(i) the final report required by (e) (iii) above;

(ii) written disclosures for all Subject Inventions required by (c) (i) above which are shown to be due in accordance with interim reports delivered under (c) (ii) above or in accordance with such final reports or are otherwise known to be unreported; and

(iii) the information as to any subcontractor required by (h) below. The maximum amount which may be withheld under this paragraph (f) shall not exceed ten percent (10%) of the amount of this contract or five thousand dollars ($5,000), whichever is less, and no amount shall be withheld under this paragraph (f) when the amount specified by this paragraph (f) is being withheld under other provisions of this contract. The withholding of any amount or subsequent payment thereof to the Contractor shall not be construed as a waiver of any rights accruing to the Government under this contract. This paragraph (f) shall not be construed as requiring the Contractor to withhold any amounts from a subcontractor to enforce compliance with the patent provisions of a subcontract.

(g) The Contractor shall exert all reasonable effort in negotiating for the inclusion of this Patent Rights clause in any subcontract hereunder of three thousand dollars ($3,000) or more having experimental, developmental, or research work as one of its purposes. In the event of refusal by a subcontractor to accept the Patent Rights clause, the Contractor shall not proceed with the subcontract without written authorization of the Contracting Officer, and upon obtaining such authorization, shall cooperate with the Government in the negotiation with such subcontractor of an acceptable patent rights clause; *provided*, however, that the Contractor shall in any event require the subcontractor to grant to the Government patent rights under Subject Inventions of no less scope and on no less favorable terms than those which the Contractor has under such subcontracts, except that in no event shall the subcontractor be required to grant to the Government patent rights in excess of those herein agreed to be granted to the Government by the Contractor.

(h) The Contractor shall, at the earliest practicable date, notify the Contracting Officer in writing of any subcontract containing a patent rights clause, furnish the Contracting Officer a copy of such clause, and notify the Contracting Officer when such subcontract is completed. It is understood that with respect to such subcontract clause, the Government is a third party beneficiary; and the Contractor hereby assigns to the Government all the rights that the Contractor would have to enforce the subcontractor's obligations for the benefit of the Government with respect to Subject Inventions. The Contractor shall not be obligated to enforce the agreements of any subcontractor hereunder relating to Subject Inventions.

[Contract clause continued on next page]

(i) When the Contractor shows that it has been delayed in the performance of this contract by reason of its inability to obtain in accordance with (g) above a suitable patent rights clause from a qualified subcontractor for any item or service required under this contract for which the Contractor itself does not have available facilities or qualified personnel, the Contractor's delivery dates shall be extended for a period of time equal to the duration of such delay; and, upon request of the Contractor, the Contracting Officer shall determine to what extent, if any, an additional extension of the delivery dates and increase in contract prices based upon additional costs incurred by such delay are proper under the circumstances; and the contract shall be modified accordingly. If the Contractor, after exerting all reasonable effort, is unable to obtain a qualified subcontractor as set forth above, the Contractor may submit to the Contracting Officer a written request for waiver or modification of the requirement that a suitable patent rights clause be included in the subcontract.

Such request shall specifically state that the Contractor has used all reasonable effort to obtain such qualified subcontractor, and shall cite the waiver or termination provision hereinafter set forth. If, within thirty-five (35) days after the date of receipt of such request for a waiver or modification of said requirement, the Contracting Officer shall fail to deny in writing such request, the requirement shall be deemed to have been waived by the Government. If within such period the Contractor shall receive a written denial of such request by the Contracting Officer, this contract shall thereupon automatically terminate and the rights and obligations of the parties shall be governed by the provisions of the clause of this contract providing for termination for the convenience of the Government.

9–107.2 Contracts Relating to Atomic Energy.

(a) Except as provided in (b) below the following paragraph shall be inserted as part of the Patent Rights clause set forth in ASPR 9–107.1 in all research or development contracts relating to atomic energy.

(j) With respect to any Subject Invention made by employees of the Contractor (except clerical and manual labor personnel who do not have access to technical data), and relating to the production or utilization of special nuclear material or atomic energy within the purview of the Atomic Energy Acts of 1946 (42 U. S. Code 1801–1819) and of 1954 (42 U. S. Code 2011–2296), the Contractor agrees:

(i) to furnish to the United States Atomic Energy Commission (hereinafter in this paragraph (j) referred to as "the Commission") through the Contracting Officer complete information regarding such Subject Invention, the Commission to have the sole and conclusive power to determine whether and where a patent application shall be filed, and to determine the disposition of the title to and rights under any such application or any patent that may issue thereon;

(ii) to obtain the execution of and deliver to the Commission, all documents relating to each such Subject Invention and to do all things necessary or proper to carry out any determination of the Commission, made under (j) (i) above;

[Contract clause continued on next page]

(iii) unless otherwise authorized in writing by the Commission to obtain patent agreements from all such employees to effectuate the purposes of this paragraph (j); and

(iv) unless otherwise authorized in writing by the Commission, to insert this paragraph (j) in all subcontracts.

No claim for pecuniary award or compensation under the provisions of the Atomic Energy Acts of 1946 and 1954 shall be asserted by the Contractor or its employees with respect to any Subject Invention covered by this paragraph.

(b) Where the work to be performed or the material or equipment to be furnished by the contractor is of such character that any such Subject Inventions that may be made will probably (i) relate only incidentally (and not directly) to some phase of the basic research or development work which the Atomic Energy Commission conducts or sponsors, (ii) relate to a field or work in which the contractor has an established industrial and patent position, or (iii) result from routine development or production work by the contractor, a provision authorizing the contractor to retain license rights may be incorporated in the paragraph set forth in (a) above. Any such provision or any deviation from the paragraph set forth in (a) above, which the military department concerned proposes to authorize, shall be forwarded in accordance with Departmental procedures to the Atomic Energy Commission for recommendation and shall not be authorized except with the concurrence of the Atomic Energy Commission.

9–107.3 Patent License Rights Under Product Improvement Programs or Independent Research Programs. Where a Military Department, under its established procedures, provides substantial financial support to a contractor's

(i) specific product improvement program; or

(ii) specific projects within its independent research program;

the Military Department may obtain for the Government patent license rights to inventions, improvements, or discoveries conceived or first actually reduced to practice during or as a result of such support; *provided* the obtaining of such rights and the contractual arrangements for such rights are approved in the Army and the Navy by the head of the procuring activity concerned, and in the Air Force by the Deputy Director/Procurement, Headquarters, Air Materiel Command or by the Director of Procurement, Headquarters, Air Research and Development Command.

9–107.4 Patent Rights Not To Be Obtained.

(a) Except as authorized in ASPR 9–107.1, 9–107.2, 9–107.3, and (b) below, patent license rights shall not be requested in the negotiation of contracts for supplies or services (other than contracts where the primary item of procurement is a license under or an assignment of a patent). It is the policy of the Military Departments, except as otherwise provided in ASPR 9–107.1, to pay a reasonable compensation for the use of an invention covered by a valid patent enforceable against the Government, but the questions of infringement, validity, and enforceability of the patent shall be determined by personnel having cognizance of patent matters for the Military Department concerned.

(b) The provisions of (a) above are not applicable to contracts to be performed outside the United States, its Territories, its possessions, or Puerto Rico.

9–107.5 Contracts Relating to Civil Defense. The paragraph set forth below may be inserted in lieu of paragraph (b) (1) as part of the Patent Rights clause prescribed in ASPR 9–107.1 (c) in all contracts for experimental, developmental, or research work relating primarily to supplies or services intended for the general public for civil defense purposes.

(b) (1) The Contractor agrees to and does hereby grant to the Government an irrevocable, nonexclusive, nontransferable, and royalty-free license to practice, and cause to be practiced by or for the United States Government, throughout the world, each Subject Invention in the manufacture, use and disposition of any article or material, and in the use of any method; with the right in the Government to sublicense others to practice each Subject Invention in the manufacture, use and sale of any article or in the use of any method for the purpose of providing supplies or services to the general public in the furtherance of the nation's civil defense.

9–108 Patent Rights under Contracts for Personal Services. The following clause shall, except as otherwise provided in ASPR 7–503.9, be inserted in all personal services contracts for services to be performed by an individual as set forth in ASPR 7–502.

PATENTS

(a) For the purpose of determining the rights of the Government and the Contractor in and to inventions, the Contractor agrees to be bound by all provisions of Executive Order 10096, dated 23 January 1950, and any orders, rules, regulations, or the like issued thereunder.

(b) The Contractor shall: (i) make written disclosure promptly to the Contracting Officer of all inventions of the Contractor which are conceived or first reduced to practice during the term of this contract, and sign and execute all papers necessary for conveying to the Government the rights to which the Government is entitled in accordance with the determination made under the provisions of Executive Order 10096, or (ii) certify to the Contracting Officer that, to the best of the Contractor's knowledge and belief, no inventions have been conceived or first reduced to practice during the term of this contract.

9–109 Followup of Patent Rights. Appropriate systems of followup in connection with contracts for experimental, developmental, or research work shall be maintained by the Military Departments in order that inventions in which the Government may have an interest may be properly identified and formal agreements evidencing the Government's rights therein shall be obtained.

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9–110 Reporting of Royalties. The Government has acquired license and other rights under a large number of inventions as the result of Government-sponsored research and development and in other ways. In order that the Government may determine whether the charging of royalties to the Government is inconsistent with the rights which the Government has acquired or is otherwise improper and in order that negotiation for the voluntary reduction of excessive royalties may be undertaken, the Military Departments should be informed of royalties charged or to be charged in connection with the performance of Government contracts. The contract clause set forth below shall be included in all contracts in excess of $50,000, except as follows:

(i) The clause shall not be included in contracts coming within the provisions of ASPR 9–110.2.

(ii) The clause shall not be included in contracts of $50,000 or less, except that, as a matter of administrative convenience, the clause need not be deleted when it is a part of a standardized form being used for contracts of $50,000 or less, since it is self-deleting as to such contracts.

(iii) The clause need not be included in contracts for experimental, developmental, or research work, regardless of the amount of the contract, where under such contracts only a report or reports are to be delivered to or for the Government.

REPORTING OF ROYALTIES

The provisions of this clause shall be applicable only if the amount of the contract is in excess of $50,000.

(a) The Contractor shall report in writing (in quadruplicate) to the Contracting Officer as soon as practicable after execution of this contract whether or not any royalties in excess of $250 have been paid or are to be paid by the Contractor directly to any person or firm in connection with the performance of this contract. If royalties in excess of $250 have been paid or are to be paid to any person or firm, the report shall include the following items of information with respect to such royalties (including the initial $250):

(1) The name and address of each licensor to whom royalties in excess of $250 have been paid or are to be paid,

(2) The patent numbers, patent application serial numbers (with filing dates), or other identification of the basis for such royalties,

(3) The manner of computing the royalties consisting of (i) a brief identification of each royalty-bearing unit or process, (ii) the total amount of royalties, and (iii) the percentage rate or dollars and cents amount of royalties on each such unit or process; *provided* that if the royalties cannot be computed in terms of units or dollars and cents value, then other data showing the manner in which the Contractor computes the royalties.

(Clause continued on next page)

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(b) In lieu of furnishing a report under paragraph (a), the Contractor may furnish a single, consolidated report for each accounting period of the Contractor during which the Contractor has contracts with the Government, provided the Contractor has requested and obtained the prior written approval of the ----------*. Such consolidated report shall be furnished, when the furnishing thereof has been approved, in the number of copies as approved, as soon as practicable after the close of the accounting period covered by the report. Such consolidated report shall be made in accordance with Contractor's established accounting practice and shall include, for the accounting period, the total amount of royalties accruing to each licensor at a rate in excess of $1,000 per annum on the Contractor's over-all business, together with (i) the name and address of each such licensor, (ii) the patent numbers, patent application serial numbers (with filing dates), or other identification of the basis for such royalties, (iii) a brief description of the subject matter of the license under which royalties are charged, (iv) the percentage rate or unit amount, or if the royalties do not accrue by rate or unit amount, such other data showing the manner by which the royalties accrue to licensor, and (v) an estimate or approximation (without detailed accounting) of the portion of such royalties that may be attributable to Government contracts. The Contractor shall, if requested by the Government, furnish at Government expense a more detailed allocation of such royalty payments attributable to Government contracts.

(c) In the event that the Contractor requests written approval to furnish consolidated reports under paragraph (b) above, the ----------* shall promptly consider the request and furnish to the Contractor a letter stating whether or not the request is approved and, notwithstanding any such approval, the Contracting Officer shall have the right to question any such subsequently furnished report as to accuracy or completeness of data and to ask for additional information. The Contractor shall furnish a copy of such letter of approval to the Contracting Officer administering this contract.

(d) After payment of eighty percent (80%) of the amount of this contract, as from time to time amended, further payment shall be withheld until a reserve of either (i) ten percent (10%) of such amount or (ii) $5,000, whichever is less, shall have been set aside, such reserve or the balance thereof to be retained until the Contractor shall have furnished to the Contracting Officer the report called for by paragraph (a) hereof or the copy of the letter approving the Contractor's request to furnish the report under paragraph (b); *provided*, that no amount shall continue to be withheld from payment for the causes specified in this paragraph (d) if the Contracting Officer shall find that the Contractor has not been furnished a letter as required by paragraph (c) within a reasonable time after making written request to submit a single, consolidated report under the provisions of paragraph (b) of this clause, and *provided further*, that the Contracting Officer may, in his discretion, order payment to be withheld in the amount and manner above provided if the report called for by paragraph (a) is unsatisfactory or if the ----------* notifies the Contracting Officer that the report called for by paragraph (b) is due but has not been received, or if received, is found to be unsatisfactory. No amount shall be withheld under this paragraph when the minimum amount specified by this paragraph is being withheld under other provisions of this contract. The withholding of any amount or subsequent payment thereof to the Contractor shall not be construed as a waiver of any right accruing to the Government under this contract.

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In the foregoing clause, insert, in the space designated by an asterisk (____*) in contracts of the Department of the Army and the Department of the Air Force, the words "Chief, Patents Division, Office of The Judge Advocate General;" and in contracts of the Department of the Navy, the words "Assistant Chief of Naval Research for Patents."

9–110.1 Approved Form of Royalty Report. See ASPR 16–806 for an approved form for optional use by contractors in making reports as required by paragraph (a) of the Reporting of Royalties clause of ASPR 9–110.

9–110.2 Reporting of Royalties in Contracts To Be Performed Outside the United States. In contracts where the work is to be performed outside the United States, its Territories, its possessions, or Puerto Rico, regardless of the place of delivery, the following clause shall be included in the contract:

REPORTING OF ROYALTIES (FOREIGN)

If this contract is in an amount which exceeds $50,000, the Contractor shall report in writing to the Contracting Officer during the performance of this contract the amount of royalties paid or to be paid by the Contractor directly to others in the performance of this contract. The Contractor shall also (i) furnish in writing any additional information relating to such royalties as may be requested by the Contracting Officer and (ii) insert a provision similar to this clause in any subcontract hereunder which involves an amount in excess of the equivalent of fifty thousand United States dollars.

9–111 Adjustment of Royalties. If the contracting officer believes that any royalties paid, or to be paid, under a contract or prospective contract are unreasonable or otherwise improper, he should promptly report the matter to personnel having cognizance of patent matters for the procuring activity concerned. Such personnel shall review the royalties thus reported and such royalties as are reported under ASPR 9–110. In coordination with the contracting officer, such personnel shall:

(i) take prompt action to protect the Government against payment of royalties on supplies or services (A) with respect to which the Government has a royalty-free license, or (B) at a rate in excess of the rate at which the Government is licensed, or (C) where the royalties in whole or in part constitute an improper charge;

(ii) in appropriate cases enter into negotiation for a voluntary reduction of royalties.

9–112 Reserved.

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Part 2—Data and Copyrights

9-200 Scope of Part. This part sets forth the Department of Defense policy, implementing instructions, and contract clauses with respect to acquisition and use of writings, sound recordings, pictorial reproductions, drawings, or other graphic representations and works of any similar nature (whether or not copyrighted), hereinafter called "data", furnished under contract.

9-201 Definitions. For the purposes of this Part 2, the following terms have the meanings set forth below:

(a) "Operational data" means data providing information suitable, among other things, for instruction, operation, maintenance, evaluation or testing.

(b) "Design data" means data providing descriptive or design drawings which could be used by any competent manufacturer, in conjunction with its own internal manufacturing techniques and processes, to reproduce the supplies and services.

(c) "Proprietary data" means data providing information concerning the details of the contractor's trade secrets or manufacturing processes which are not disclosed by the design itself and which the contractor has the right to protect from use by others.

(d) "Standard commercial items" means supplies or services which are sold or offered to the public commercially.

9-202 Acquisition and Use of Data and Copyrights.

9-202.1 Acquisition of Data.

(a) *General.* It is the policy of the Department of Defense to acquire only that data which is essential for the purposes for which it is intended to be used. Generally "operational data" and "design data" should satisfy government requirements. Further, data shall not be acquired for other than governmental purposes. The price for such data may be listed separately from the price for other items being purchased in the contract.

(b) *Supply Contracts.* In advertised contracts and in contracts for standard commercial items, "proprietary data" should not be requested. "Proprietary data" will be obtained under contracts for other than standard commercial items only when a clear government need for such data is established. When "proprietary data" is so obtained, there shall be a specific negotiation for such data and the contractual requirement shall be listed as a separate contract item.

(c) *Contracts for Experimental, Developmental, or Research Work.* In a contract which has as one of its principal purposes experimental, developmental, or research work and also calls for models of equipment or practical processes, the contractor shall be required to furnish all data necessary to enable manufacture of the equipment or performance of the process; except that such data need not be required for standard commercial items to be furnished under the contract and to be incorporated as component parts in or to be used with the product being developed if, in lieu thereof, requirement is made for identification of source, and performance specifications and characteristics sufficient to enable the Government to procure from any supplier the part or an adequate substitute. Under such a contract the Government is entitled to all data resulting

[ASPR 9-202.1 continued on next page]

from performance thereunder. Any previously developed "proprietary data" should be required only where the product could not readily be manufactured or the process performed without the use of such "proprietary data."

9–202.2 Use of Data.

(a) *Operational and Design Data.* Since "operational data" and "design data" as defined above do not call for the disclosure of details of the contractor's trade secrets or manufacturing processes which the contractor has the right to protect, such data should be obtained without any limitation as to its use by the Government.

(b) *Proprietary Data.*

(i) *Contracts for Experimental, Developmental, or Research Work.* When "proprietary data" is obtained under a contract having as one of its principal purposes experimental, developmental, or research work, in accordance with ASPR 9–202.1 (c), it shall be obtained without limitation as to its use.

(ii) *Supply Contracts.* When "proprietary data" is obtained by negotiation under a supply contract, in accordance with ASPR 9–202.1 (b), the purpose for obtaining it will govern its use. If it was obtained for the purpose of enabling the Government to establish additional sources of supply, it should be obtained without limitation as to its use. Where, however, it has been determined to be necessary to obtain "proprietary data" for some limited purpose, such as emergency manufacture by the Government, such data may be obtained subject to limitation as to its use. In such cases the contract clause contained in ASPR 9–203.2 shall be included in the contract and the contract Schedule shall specifically identify the data which shall be subject to limited use.

9–202.3 Multiple Sources of Supplies. The Government's interest in establishing multiple sources for supplies and services arises from its need, among other things, to (i) facilitate competition for defense procurement, (ii) insure fulfillment of its current and mobilization requirements, and (iii) take advantage of small business potential. The foregoing policies provide one means for accomplishing this objective and are particularly effective where data acquired by the Government is usable, without more, to obtain competition. However, where highly complex technical equipment is involved and acquisition of data, without technical assistance from the primary source, is inadequate to establish second sources, Government participation in any licensing and technical assistance arrangements may be necessary to protect the Government's interest with respect to such factors, among others, as (a) investment in facilities, (b) competency of source, (c) timing of establishment of second sources, and (d) allocation of orders among sources. In many instances, involving relatively simple items, commercial or military, which have been developed by a contractor at its own expense, participation by the Government may be unnecessary where the primary source is willing to establish other sources by direct contractor to contractor licensing arrangements. No single method can be prescribed for meeting the second source problem; each situation must be handled on its own merits.

9–202.4 Delivery of Data for Use in Foreign Countries. Where the Department of Defense proposes to make available any data in its possession for use in a foreign country, it shall, to the maximum extent practicable, give reasonable notice thereof to the contractor who furnished the data, provided that the contractor has previously requested such notice in order to protect its foreign patent position.

9–202.5 Copyrights. It is the policy of the Department of Defense generally to reserve only a license under copyright on any copyrighted data, leaving the contractor free to copyright the material. With respect to certain data produced, written, or compiled for the Department of Defense, such as (i) motion pictures and works relating thereto, and (ii) histories and other works relating to operation of the Department of Defense, the Government may desire that no adverse claim of copyright be established in such data, and that the Government's right to reproduce and use such data shall be unlimited.

9–203 Contract Clauses—General. In any contract to be performed in the United States, its Territories, or possessions, or Puerto Rico in which data is specified to be delivered, insert, in accordance with ASPR 9–202.2, one of the clauses of ASPR 9–203.1 or 9–203.2, as appropriate, except that such clauses shall not be used in contracts coming within the provisions of ASPR 9–204.2, 9–204.3, and 9–205, nor in contracts to be performed outside the United States, its Territories, or possessions, or Puerto Rico.

9–203.1 Unlimited Rights to Use Data.

RIGHTS IN DATA—UNLIMITED

(a) The term "Subject Data" as used herein includes writings, sound recordings, pictorial reproductions, drawings or other graphical representations, and works of any similar nature (whether or not copyrighted) which are specified to be delivered under this contract. The term does not include financial reports, cost analyses and other information incidental to contract administration.

(b) Subject to the proviso of (c) below, the Government may duplicate, use, and disclose in any manner and for any purpose whatsoever, and have others so do, all Subject Data delivered under this contract.

(c) The Contractor agrees to and does hereby grant to the Government, and to its officers, agents, and employees acting within the scope of their official duties, a royalty-free, non-exclusive and irrevocable license throughout the world, to publish, translate, reproduce, deliver, perform, dispose of, and to authorize others so to do, all Subject Data now or hereafter covered by copyright; *provided* that with respect to such Subject Data not originated in the performance of this contract but which is incorporated in the work furnished under this contract such license shall be only to the extent that the Contractor, its employees, or any individual or concern specifically employed or assigned by the Contractor to originate and prepare such Data under this contract, now has, or prior to completion or final settlement of this contract may acquire, the right to grant such license without becoming liable to pay compensation to others solely because of such grant.

(d) The Contractor shall exert all reasonable effort to advise the Contracting Officer, at the time of delivery of the Subject Data furnished under this contract, of all invasions of the right of privacy contained therein and of all portions of such Data copied from work not composed or produced in the performance of this contract and not licensed under this clause.

[Contract clause continued on next page]

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(e) The Contractor shall report to the Contracting Officer, promptly and in reasonable written detail, each notice or claim of copyright infringement received by the Contractor with respect to all Subject Data delivered under this contract.

(f) Nothing contained in this clause shall imply a license to the Government under any patent or be construed as affecting the scope of any license or other right otherwise granted to the Government under any patent.

(g) The Contractor shall not affix any restrictive markings upon any Subject Data, and if such markings are affixed, the Government shall have the right at any time to modify, remove, obliterate or ignore any such marking.

9–203.2 Limited Rights To Use Data

RIGHTS IN DATA—LIMITED

(a) The term "Subject Data" as used herein includes writings, sound recordings, pictorial reproductions, drawings or other graphical representations, and works of any similar nature (whether or not copyrighted) which are specified to be delivered under this contract. The term does not include financial reports, cost analyses and other information incidental to contract administration.

(b) Subject Data delivered under this contract shall not be released outside the Government, nor be duplicated, used, or disclosed in whole or in part for procurement or manufacturing purposes (other than for manufacture required in connection with repair or overhaul where an item is not procurable commercially so as to enable the timely performance of the overhaul or repair work and provided that when Data is released by the Government to a contractor for such purposes, the release shall be made subject to the limitation of this clause and provided further that such Data shall not be used for manufacture or procurement of spare parts for stock), without permission of the Contractor, if: (i) the Subject Data to be so limited is identified in the Schedule as being subject to limitations; and (ii) the following legend is marked on each piece of data so limited [*In third blank of legend, identify portion or pages to which legend is applicable*]:

> This _____ is furnished under U. S. Government Contract No. _____, and _____ shall not be released outside the Government (except to foreign governments, subject to these same limitations), nor be disclosed, used, or duplicated, for procurement or manufacturing purposes, except as otherwise authorized by said contract, without the permission of _____. This legend shall be marked on any reproduction hereof in whole or in part.

provided that such Data may be delivered to foreign governments as the national interest of the United States may require, subject to the limitations specified in this paragraph. The Contractor shall not impose limitations on the use of any piece of Data, or any portion thereof, containing information first produced in the performance of a Government contract.

(c) Notwithstanding any provisions of this contract concerning inspection and acceptance, the Government shall have the right at any time to modify, remove, obliterate or ignore any marking not authorized by the terms of this contract on any piece of Subject Data furnished under this contract, subject to the right of the Contractor to appeal under the "Disputes" clause from the decision of the Contracting Officer.

[Contract clause continued on next page]

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legend is marked on each piece of data so limited [*In third blank of legend, identify portion or pages to which legend is applicable*]:

This ..... is furnished under U. S. Government Contract No. ....., and ..... shall not be released outside the Government (except to foreign governments, subject to these same limitations), nor be disclosed, used, or duplicated, for procurement or manufacturing purposes, except as otherwise authorized by said contract, without the permission of ..... This legend shall be marked on any reproduction hereof in whole or in part.

provided that such Data may be delivered to foreign governments as the national interest of the United States may require, subject to the limitations specified in this paragraph. The Contractor shall not impose limitations on the use of any piece of Data, or any portion thereof, containing information first produced in the performance of a government contract.

(c) Notwithstanding any provisions of this contract concerning inspection and acceptance, the Government shall have the right at any time to modify, remove, obliterate or ignore any marking not authorized by the terms of this contract on any piece of Subject Data furnished under this contract, subject to the right of the Contractor to appeal under the "Disputes" clause from the decision of the Contracting Officer.

[Contract clause continued on next page]

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(d) Subject to the proviso in (e) below, the Government may duplicate, use, and disclose in any manner and for any purpose whatsoever, and have others so do, all Subject Data not covered by (b) above which is delivered under this contract.

(e) The Contractor agrees to and does hereby grant to the Government, and to its officers, agents, and employees acting within the scope of their official duties, a royalty-free, nonexclusive and irrevocable license throughout the world, to publish, translate, reproduce, deliver, perform, dispose of, and to authorize others so to do, all Subject Data now or hereafter covered by copyright; *provided* that with respect to such Subject Data not originated in the performance of this contract but which is incorporated in the work furnished under this contract such license shall be only to the extent that the Contractor, its employees, or any individual or concern specifically employed or assigned by the Contractor to originate and prepare such Data under this contract, now has, or prior to completion or final settlement of this contract may acquire, the right to grant such license without becoming liable to pay compensation to others solely because of such grant.

(f) The Contractor shall exert all reasonable effort to advise the Contracting Officer, at the time of delivery of the Subject Data furnished under this contract, of all invasions of the right of privacy contained therein and of all portions of such Data copied from work not composed or produced in the performance of this contract and not licensed under this clause.

(g) The Contractor shall report to the Contracting Officer, promptly and in reasonable written detail, each notice or claim of copyright infringement received by the Contractor with respect to all Subject Data delivered under this contract.

(h) Nothing contained in this clause shall imply a license to the Government under any patent or be construed as affecting the scope of any license or other right otherwise granted to the Government under any patent. Nothing contained in this clause shall be construed as prohibiting the Government from manufacturing, or having manufactured for it by or procuring from others than the Contractor, that which is shown in or by such Data, so long as the Data, or a copy in whole or in part, to which the limitation in (b) above applies, is not used in such manufacture or procurement.

9–204 Contract Clauses—Special.

9–204.1 Limitation on Government's Right of Publication for Sale to the General Public. The paragraph set forth below may be added to the clause of ASPR 9–203.1 when, in contracts for research, the contracting officer determines in accordance with Departmental procedures that public dissemination of the work or certain designated parts of the work specified to be delivered under contract is in the best interest of the Government and would be facilitated by the Government relinquishing its right to publish for sale or to have others publish for sale for it. This paragraph shall not be used otherwise.

(h) If the Contractor publishes for sale or causes to be published for sale within ____ months after final settlement of this contract or within such additional period as the Contracting Officer may approve, but in any event within a period no greater than 24 months, the Subject Data designated immediately following this paragraph, which is delivered under this contract, the Government agrees not to publish for sale or authorize others so to do. This limitation on the Government's right to publish for sale shall continue as long as the work is protected by copyright, with

respect to any such designated work which is so published within such period of time, and as to all work not so published within such period of time, this paragraph shall be of no force or effect. The following Subject Data is designated:

9–204.2 Production of Motion Pictures. This clause set forth below is approved for use in contracts for the production of motion pictures with or without accompanying sound, and in all contracts for the preparation of motion picture scripts, musical compositions, sound tracks, translations, adaptations, and the like:

RIGHTS IN DATA

(a) The term "Subject Data" as used herein includes writings, sound recordings, pictorial reproductions, drawings or other graphical representations, and works of any similar nature (whether or not copyrighted) which are specified to be delivered under this contract. The term does not include financial reports, cost analyses and other information incidental to contract administration.

(b) All Subject Data first produced in the performance of this contract shall be the sole property of the Government. The Contractor agrees not to assert any rights at common law or equity and not to establish any claim to statutory copyright in such Data. The Contractor shall not publish or reproduce such Data in whole or in part or in any manner or form, nor authorize others so to do, without the written consent of the Government until such time as the Government may have released such Data to the public.

(c) The Contractor agrees to grant and does hereby grant to the Government and to its officers, agents and employees acting within the scope of their official duties, a royalty-free, nonexclusive, and irrevocable license throughout the world (i) to publish, translate, reproduce, deliver, perform, use, and dispose of, in any manner, any and all Data not first produced or composed in the performance of this contract but which is incorporated in the work furnished under this contract; and (ii) to authorize others so to do.

(d) The Contractor shall indemnify and save and hold harmless the Government, its officers, agents and employees acting within the scope of their official duties against any liability, including costs and expenses, (i) for violation of proprietary rights, copyright or right of privacy, arising out of the publication, translation, reproduction, delivery, performance, use or disposition of any Data furnished under this contract, or (ii) based upon any libelous or other unlawful matter contained in such Data.

(e) Nothing contained in this clause shall imply a license to the Government under any patent or be construed as affecting the scope of any license or other right otherwise granted to the Government under any patent.

(f) Paragraphs (c) and (d) above are not applicable to material furnished to the Contractor by the Government and incorporated in the work furnished under the contract; provided, such incorporated material is identified by the Contractor at the time of delivery of such work.

9–204.3 Histories and Other Works. The contract clause set forth in ASPR 9–204.2 is suggested for use in contracts for:

(a) Histories of the respective Departments or services or units thereof;

(b) Works pertaining to recruiting, morale, training or career guidance;

(c) Surveys of Government establishments;

(d) Works pertaining to the instruction or guidance of Government officers and employees in the discharge of their official duties.

9–205 Contracts for Acquisition of Existing Works.

9–205.1 Off-the-Shelf Purchase of Books and Similar Items. Notwithstanding the instructions of any other paragraphs in this Part, no contract clause contained in this Part 2 need be included in contracts for the separate, sole procurement of data, other than motion pictures, in the exact form in which such material exists prior to the initiation of a request for purchase (such as off-the-shelf purchases of existing products) unless the right to reproduce such data is an objective of the contract.

9–205.2 Contracts for Existing Motion Pictures. Contracts for the procurement of existing motion pictures or for the modification of existing motion pictures shall be made in accordance with Departmental procedures.

9–206 Contracts To Be Performed Outside the United States.

(a) Except as otherwise provided in ASPR 9–204.2, 9–204.3, or 9–205, the clause set forth below shall be included in all contracts under which (i) technical information including reports, drawings, blueprints or other data is specified to be delivered to the Government, and (ii) the work is to be performed outside the United States, its Territories, its possessions, or Puerto Rico, regardless of the place of delivery.

TECHNICAL INFORMATION

The Government may duplicate, use, and disclose in any manner for its governmental purposes, including delivery to other governments for the furtherance of mutual defense of the United States Government and such other governments, all or any part of the technical information including reports, drawings, blueprints, and other data specified to be delivered by the Contractor to the Government under this contract.

(b) The above clause may be modified by substituting "the United States Government" for "Government"; however, when the contractor is a foreign government, the above clause shall be modified by substituting "the United States Government" for "Government" and by substituting the name of the foreign government for "Contractor."

STATEMENT OF DR. ALAN T. WATERMAN, DIRECTOR, NATIONAL SCIENCE FOUNDATION, ACCOMPANIED BY WILLIAM HOFF, GENERAL COUNSEL, NATIONAL SCIENCE FOUNDATION

Senator ANDERSON. Our next witness is Dr. Alan T. Waterman, Director of the National Science Foundation.

Dr. Waterman, the committee is looking forward to your contribution.

I am inserting, at the request of the chairman, your biography, Dr. Waterman, into our record, and we are ready for any statement you may wish to make to the committee.

(The biography referred to is as follows:)

BIOGRAPHY OF DR. ALAN T. WATERMAN, DIRECTOR, NATIONAL SCIENCE FOUNDATION

Dr. Waterman was born June 4, 1892, in Cornwall on the Hudson, N. Y. A graduate of Princeton University, bachelor of arts, 1913, he received the degree of doctor of philosophy in physics from Princeton in 1916. During the next year he was instructor in physics at the University of Cincinnati. After 2 years military service (private to first lieutenant) with the Science and Research Division of the Army Signal Corps in World War I, he joined the faculty of Yale University and remained in the department of physics there until 1948, with leave of absence during 1927–28 on a national research fellowship to King's College, London; to Massachusetts Institute of Technology in 1937, and to the Office of Scientific Research and Development from 1942 to 1946. Dr. Waterman holds several honorary degrees.

During World War II, Dr. Waterman served as Vice Chairman of Division D and as assistant to member, National Defense Research Committee. From 1943 to 1945, he was Deputy Chief and later Chief of the Office of Field Service, Office of Scientific Research and Development. From 1946 to 1951, Dr. Waterman was with the Office of Naval Research, Department of the Navy, in the position of Deputy to the Chief and Chief Scientist. Dr. Waterman was appointed Director of the National Science Foundation on April 6, 1951.

Dr. Waterman is a fellow of the American Association for the Advancement of Science, the American Physical Society, the American Association of Physics Teachers, and the New York Academy of Sciences. He is a member of the American Association of University Professors, the Washington Academy of Sciences, the Washington Academy of Medicine, Phi Beta Kappa, Sigma Xi, the Scientific Research Society of America, and the Washington Philosophical Society. He serves as a member of the Defense Science Board and the Advisory Panel on General Sciences of the Department of Defense, and of the Science Advisory Committee and the Committee on Specialized Personnel of the Office of Defense Mobilization. He is also a member of the President's Advisory Committee on Weather Control. Dr Waterman is a member of the board of directors of the Center for Advanced Study in the Behavioral Sciences, the board of trustees of Atoms for Peace Awards, and of the board of directors of the American Association for the Advancement of Science.

Dr. WATERMAN. Thank you, sir.

Mr. Chairman and members of the committee, I am very happy to appear before you today to give my views on matters relating to the need for efforts to accelerate our progress in space research, technology, and exploration, and more particularly regarding proposed organizational arrangements within the Government for this purpose.

Our objectives in space research and exploration were clearly expressed by the President in his message to the Congress on this subject dated April 2 in which he listed the following four factors: (1) the compelling urge of man to explore the unknown; (2) the need to assure that full advantage is taken of the military potential of space; (3) the effect on national prestige of accomplishment in space science and exploration; and (4) the opportunities for scientific observation and experimentation which will add to our knowledge of the earth, the solar system, and the universe.

Being in full agreement with these objectives, at the outset let me state that I heartily endorse in general S. 3609, which I believe is before you. The establishment of a new civilian agency appears to me to be the best method of carrying out the objectives desired. This is particularly true since the new agency could retain the successful experience and excellent relationships of NACA. In this way the hard-won lessons of the past will assist us to make the most rapid possible progress in developing the means for exploration and of actual flight in outer space. Furthermore, the vast new horizons that will be opened up by progress in this area of scientific activity are of concern to very many segments of the national community; they include, but stretch far beyond, purely military considerations. Finally, a civilian-led program would place this country in a position to cooperate with other nations with respect to conquering the problems of space exploration, and would better assure a cooperative world reaction than would an effort conducted by the military.

The impetus for a determined effort in the direction of space exploration was, as you know, provided by the International Geophysical Year. The Comité Special de l'Année Geophysique Internationale (CSAGI) passed a resolution in 1954 encouraging any nation if possible to put a satellite in orbit during the International Geophysical Year. As you know, this challenge was accepted by the United States and later by the U. S. S. R.; as a result both countries have succeeded in placing satellites with different characteristics in various orbits. As the world appears clearly to recognize, we stand on the threshold of a truly impressive phase of exploration. For the first time man is able to reach beyond the confines of his own planet. As yet we can have no clear idea where this type of exploration may lead. However, the logical thing is to limit our declared goals to immediate exploration of the new region of space which is now available, to study it carefully and make a sound determination of the value and feasibility of further steps in exploration and travel.

It must be recognized at once that this is a large and complicated undertaking. In order to succeed we must carry on highly competent research and development in the perfection of various types of rockets and rocket systems, the vehicles to be transported, and maintain close observation and tracking of these vehicles. We must likewise continue to push forward research into the most effective means of communication with space vehicles and into their recovery or the recovery from them of packages of one sort or another. Scientific observations made from all types of space vehicles such as rockets, satellites of the type already launched, so-called space platforms, and so forth, will be of very great importance.

Among the fields of science which will profit tremendously by the use of space vehicles beyond our atmosphere are thorough observations

of the sun, which include analysis of the light, heat, radio waves, and X-rays from the sun, together with study of the various particles, electrified and otherwise, which we know are emitted from the sun. These are highly important in our analysis of conditions upon the earth, specifically since these observations and analyses are certain to have a profound effect upon such matters as our knowledge of weather and climate on the earth and their fluctuations and upon radio communication. More generally speaking, full knowledge of what the sun sends to us will in time undoubtedly make possible advances in our fundamental knowledge of our earth and the history and future of our solar system. Similar observations which are essentially astronomical in nature will be highly significant in the study of the planets in our solar system and the stars in our galaxy and the other galaxies. In fact, undoubtedly the most important opportunity that astronomy has ever had will be the setting up of a fair-sized astronomical telescope on a space platform so as to observe the heavenly bodies for the first time clearly and without interference from our atmosphere, and to study their complete spectra and behavior. Other studies of great importance concern the detailed nature of the magnetic field of the earth and its variations, the existence and location of streams of electrified particles in our neighborhood, and the detailed study of the shape of the earth and the distribution of its mass, which comes from accurate tracking of satellites. Finally, observations of our planet itself from this distant vantage point will undoubtedly prove to be of great advantage to our fundamental theories concerning weather and climate. This comes from such observations as the extent of cloud cover over the entire earth and its variations, the location and behavior of storms, especially violent ones such as hurricanes and the like. Of great importance to space exploration will be the studies of the existence and behavior of clouds of cosmic dust, micrometeorites or other foreign bodies, and of course the study of cosmic rays and other effects which may be damaging to the contents of space vehicles, whether instrument or human. These latter observations, of course, have particular application to space exploration and travel.

Thus it is seen that space exploration will involve essentially two types of research which merge one into the other: First, research which is necessary to the accomplishment of space exploration; second, pure research employing space vehicles as observing stations. Both types are involved in the present IGY satellite program and in those which are planned for continuation. As you know, the National Science Foundation has had the responsibility on behalf of the United States Government for securing and administering the funds for the scientific programs in the International Geophysical Year, including the satellite program, and for the coordination of this scientific work by Government agencies, while the general planning of the United States IGY program has been in the hands of the United States National Committee for the IGY in the National Academy of Sciences-National Research Council, and the latter committee also provides coordination with other countries.

From what I have said, it will be noted that the opportunities provided by space exploration will be very strongly scientific in character and civilian rather than military, although, of course, military requirements form a part of any general program. For these reasons, may I repeat my strong conviction that the program, except for its military

portion, should be in the hands of a civilian organization such as proposed in the present bill. Because of its past responsibilities with respect to the scientific aspects of studies in outer space and because of its general responsibilities for basic research in the sciences, the National Science Foundation expects to cooperate in the planning and execution of basic scientific research which may be carried out by the use of space vehicles devised by the new agency. This would be in accord with Executive Order 10521 and is exactly what we understand the bill contemplates.

Senator ANDERSON. Dr. Waterman, the committee would like to have to include in the record of its hearings a history of the International Geophysical Year, giving the background of how the international and United States national programs were developed and financed. Would you mind furnishing that for our information?

Dr. WATERMAN. I will be glad to do that, Senator Anderson.

(The material referred to is as follows:)

MATERIAL FOR THE RECORD IN RESPONSE TO REQUEST OF SENATE SPECIAL COMMITTEE ON SPACE AND ASTRONAUTICS

I. HISTORICAL BACKGROUND AND INTERNATIONAL ORGANIZATION OF THE INTERNATIONAL GEOPHYSICAL YEAR

The period July 1, 1957, through December 31, 1958, has been designated as the International Geophysical Year (IGY). It is a period of worldwide observations and studies of the sun, and of the earth and its physical environment, including its atmosphere and the space through which it travels. Sixty-six nations are taking an active part in the program (attachment A).

The IGY is actually the third such scientific undertaking. During 1882–83, the First Polar Year, 10 nations, including the United States, conducted simultaneous cooperative scientific observations in the Arctic. Fifty years later the Second Polar Year, 1932–33, was undertaken, in which 30 nations cooperated in observations primarily in the Arctic. Both of these periods contributed greatly to the store of basic knowledge in the geophysical sciences.

In April 1950 at an informal meeting of geophysicists in this country the suggestion was offered that, because of the tremendous advances in instrumentation that had taken place in the 1940's, consideration be given to holding a Third Polar Year 25 years after the second, which would place it in 1957–58, a period of maximum sunspot activity. The suggestion was received with enthusiasm, and in subsequent discussions scientists throughout the world recognized the benefits of extending the planned program to encompass the entire earth and renamed it the International Geophysical Year to reflect the increased scope in coverage.

During the next 18 months the initial proposal was considered and supported by a number of international scientific groups, most of them members of the International Council of Scientific Unions (ICSU). The Mixed Commission on the Ionosphere endorsed it as did, also, in rapid succession, the International Scientific Radio Union, the International Astronomical Union, the International Union of Geodesy and Geophysics, and finally the International Council of Scientific Unions itself.

In 1951 the executive board of ICSU appointed the Comité Spécial de l'Année Géophysique Internationale (CSAGI), composed of representatives of the various scientific unions involved and of the World Meteorological Organization and the International Consulative Committee for Radio Communications. A Bureau of CSAGI was appointed consisting of Prof. Sydney Chapman (Great Britain), President; Dr. Lloyd V. Berkner (United States), Vice President; and Prof. M. Nicolet (Belgium), General Secretary. Later (in June 1957) Prof. V. V. Beloussov (U. S. S. R.) and Prof. J. Coulomb (France) were added as members of the Bureau.

In late 1951 and early 1952 CSAGI invited member nations of ICSU to establish special national committees to take part in the planning and guidance of the IGY. As the concept of the program expanded, invitations to all countries of the world were issued to join in the enterprise.

Individual countries are responsible for organizing and supporting their own portions of the IGY program. In general, this means that each country provides the funds, equipment, and personnel for IGY activities that they undertake within their continental limits, possessions, or in areas where they have traditionally had an interest. The total cost to the countries participating in the IGY has been unofficially estimated in excess of $300 million.

A coordinated worldwide scientific program for the IGY was synthesized from various proposals submitted by individual nations and modified through periodic meetings of CSAGI (Brussels, 1953; Rome, 1954; Brussels, 1955; and Barcelona, 1956). A fifth meeting of CSAGI is scheduled to be held in Moscow in August of this year.

II. UNITED STATES PARTICIPATION IN THE INTERNATIONAL GEOPHYSICAL YEAR

United States National Committee for the IGY

The National Academy of Sciences-National Research Council, a nongovernmental organization, as the adhering body on behalf of American scientists to the International Council of Scientific Unions and most of its Unions, was the group in the United States that received the CSAGI invitation for this country to participate in the IGY. In response to this invitation, the Academy-Council established in February 1953 the United States National Committee for the International Geophysical Year 1957–58, under the chairmanship of Dr. Joseph Kaplan, professor of physics at the University of California at Los Angeles. Dr. Alan H. Shapley of the National Bureau of Standards was named Vice Chairman, and Mr. Hugh Odishaw, formerly of the National Bureau of Standards, the Executive Director. The committee membership included appropriate representation from the various scientific disciplines involved; subcommittees were named to cover the regional programs planned (Arctic, Antarctic, Equatorial regions); and 13 technical panels were established to direct the program in the scientific disciplines of meteorology, geomagnetism, aurora and airglow, ionosphere, solar activity, cosmic rays, longitude and latitude, glaciology, oceanography, seismology, gravity, and in the programs of rocketry and communications.

Role of the National Science Foundation in the IGY

The Academy-Council recognized the importance of Government cooperation and support to the success of the United States portion of the IGY program. On November 25, 1953, the Academy-Council transmitted to the National Science Foundation the recommendation of the United States National Committee for the IGY that the Foundation be asked to take responsibility for obtaining and administering Government funds required to carry out the program and to coordinate the interests of Government agencies involved.

After consideration of the recommendation and a study of the proposed program and budget, the National Science Board at its meeting of January 29, 1954, endorsed the program and the Foundation's participation in it.

After submission of the proposed program and budget for the IGY to the Bureau of the Budget, and the submission of letters of support for the program to the Bureau of the Budget from the Departments of State, Defense, and Commerce, the Atomic Energy Commission, and the Office of Defense Mobilization, the President approved the program and included the requested amount for the National Science Foundation in support of the International Geophysical Year in a supplemental appropriation request for fiscal year 1955. Action by the Congress was approval of an initial appropriation of $2 million for the IGY program (Supplemental Appropriation Act of 1955, 83d Cong., 2d sess.). Subsequent appropriations to the National Science Foundation for the program have been $10 million (Independent Offices Appropriation Act of 1956, 84th Cong., 1st sess.); $27 million (Second Supplemental Appropriation Act of 1956, 84th Cong., 2d sess.); $2 million (Second Supplemental Appropriation Act of 1958, 85th Cong., 2d sess.). The total amount, therefore, appropriated to date for the IGY program is $41 million.

Funding of the various projects in the United States IGY program has been administered through the regular grants procedure of the National Science Foundation, upon recommendations received from the United States National Committee for the IGY. Grants or transfers to 45 institutions or agencies have been made to March 31, 1958, totaling $34,871,678 (attachment B).

The National Science Foundation has, in order to assure coordination, worked closely with other Federal agencies having an active interest and role in the IGY These include the Department of Defense, Weather Bureau, National Bureau of Standards, Coast and Geodetic Survey, and Geological Survey.

The Department of Defense is involved in the IGY program primarily in the Antarctic and earth-satellite projects. In the case of the former, the Defense contribution includes all logistic support, construction of facilities, station-keeping personnel, and transportation services. For the satellite program, agreements were reached with the Department of Defense to develop and supply suitable launching vehicles, procure range-operation costs, place satellites in orbit, and establish confirmation of the orbit, the latter involving certain parts of the ground electronics setup. The National Science Foundation agreed, as far as the earth-satellite project was concerned, to furnish funds for the scientific instrumentation, parts of the electronics ground operations, the optical-tracking ground-station network, and the substantial part of the radio-tracking and telemetry network.

III. EVOLUTION OF THE INTERNATIONAL GEOPHYSICAL YEAR PROGRAM AT NATIONAL AND INTERNATIONAL LEVELS

Taking the United States as an example of a country phase of the total IGY world effort, it can be seen how individual national programs were developed and synthesized into the international program.

First, the proposals for IGY projects were based on ideas conceived in individual laboratories or in the minds of individual scientists, thus originating at the grass-roots level in the scientific community. The original idea or proposal was first subjected to a screening process within the framework of the National Committee. In the United States, this initial screening took place in one of the technical advisory panels that had been established under the United States National Committee for the IGY.

The various individual projects that were accepted by the panel were then consolidated into a proposed disciplinary program in meteorology, or geomagnetism, for example. The disciplinary programs were next brought together into a proposed national program at Committee level. After a process of trimming to adjust the complete national program to come within the country's budget, it was sent as a proposal to the General Secretary of CSAGI, who received many such national program proposals.

A meeting of CSAGI and representatives from participating countries was called to review these programs and out of them to prepare the first draft of an international program. Working groups in the various disciplines were selected from among country delegates, generally capable scientists in the various fields of interest. These working groups were chaired by the appropriate CSAGI reporters, who had been designated to act as conveners for the development and coordination of worldwide programs suitable to the IGY in their respective fields of interest. The synthesis of the international program resulted in modifications to the individual country programs, which then went back to the national committees for reconsideration and implementation.

During the planning period for the IGY, additional suggestions for projects were received after the first cycle of approvals, necessitating a certain amount of reexamination, adjustment, enlistment of additional country support, and the reconsideration of international aspects of the program. The United States IGY earth-satellite project is a case in point. It was not until after the Rome meeting of CSAGI in 1954 that the United States National Committee determined that it was feasible technically to accept the CSAGI invitation to attempt to place a scientific earth satellite in orbit during the IGY period. Similarly, other new programs were introduced after the initial review, and significant additions were made to many other programs.

By the fall of 1956, when the fourth general meeting of CSAGI was held in Barcelona, the world program had been agreed to, with but few minor exceptions. Operating details were subsequently resolved, and complete accord was reached by the time of the beginning date set for the IGY, July 1, 1957.

Through the National Academy of Sciences' representation at the various international planning meetings held in connection with the IGY, American scientists have dealt with their colleagues from other nations in the planning of the overall scientific programs.

(NOTE.—Any documentation referred to above that is desired by the committee is available in the files of the National Science Foundation and may be furnished upon request. The total bulk of all documents precluded their attachment to this paper.)

ATTACHMENT A

COUNTRIES PARTICIPATING IN THE INTERNATIONAL GEOPHYSICAL YEAR [1]

Argentina
Australia
Austria
Belgium
Bolivia
Brazil
Bulgaria
Burma
Canada
Ceylon
Chile
China (Taipei)
Colombia
Cuba
Czechoslovakia
Denmark
Dominican Republic
East Africa
Ecuador
Egypt
Ethiopia
Finland
France
German Democratic Republic
German Federal Republic
Ghana
Greece
Guatemala
Hungary
Iceland
India
Indonesia
Iran
Ireland
Israel
Italy
Japan
Korea, Democratic Republic of
Malaya
Mexico
Mongolian Peoples Republic
Morocco
Netherlands
New Zealand
Norway
Pakistan
Panama
Peru
Philippines
Poland
Portugal
Rhodesia, Southern
Rumania
Spain
Sweden
Switzerland
Tunisia
Union of South Africa
Union of Soviet Socialist Republics
United Kingdom
United States
Uruguay
Venezuela
Vietnam Democratic Republic
Vietnam (Republic)
Yugoslavia

[1] April 15, 1958: 66 countries.

ATTACHMENT B

Summary of IGY funding (as of Mar. 31, 1958)

Institution		*Amount*
American Geographical Society		$137,593
Arctic Institute of North America		848,035
Air Force Cambridge Research Center/GRD		748,951
Army:		
Snow Ice Permafrost Establishment	$66,000	
Quartermaster Corps	10,416	
Ballistics Research Laboratory	211,200	
Signal Engineering Laboratory	770,500	
Total		1,058,116
Bartol Research Foundation of the Franklin Institute		108,000
Boston College		23,550
California Institute of Technology		361,230
Carnegie Institution of Washington		62,550
Coast and Geodetic Survey		1,358,625
Columbia University		938,380
Cornell University		217,992
Dartmouth College		156,900
Department of Interior, Pacific Oceanic Fisheries Institute		11,300
Glenn L. Martin Co., Research Institute for Advanced Studies		15,000
National Academy of Sciences		670,623

Summary of IGY funding (as of Mar. 31, 1958)—Continued

Institution		*Amount*
Navy:		
Bureau of Ships	$14,360	
Hydrographic Office	30,000	
Naval Research Laboratory	14,913,964	
Total		$14,958,324
National Bureau of Standards		2,334,521
New York University		123,000
Pennsylvania State University		92,853
Rensselaer Polytechnic Institute		2,000
Smithsonian Institution		2,822,363
Southern Illinois University		2,000
Stanford University		697,513
State University of Iowa		532,375
Texas Agricultural and Mechanical Research Foundation		120,753
University of Alaska		694,503
University of California:		
Los Angeles	$34,750	
Scripps Institution of Oceanography	762,990	
Berkeley	51,300	
Santa Barbara	16,000	
Total		865,040
University of Chicago		193,902
University of Colorado, High Altitude Observatory		132,288
Univeristy of Hawaii		20,000
University of Illinois		46,250
University of Maryland		175,135
University of Michigan		90,900
University of Minnesota		204,205
University of Missouri		8,000
University of Nebraska		45,000
University of New Mexico		32,175
University of Puerto Rico		6,800
University of Rochester		5,000
University of Virginia		36,900
University of Washington		188,925
University of Wisconsin		174,220
Woods Hole Oceanographic Institution		284,125
U. S. Weather Bureau		2,280,933
Dr. Yagoda		2,400
Total technical program		33,889,248
National Academy of Sciences (support of U. S. National Committee for IGY)		982,430
Subtotal		34,871,678
Total funds appropriated		41,000,000
Remaining funds committed but unobligated		6,128,322

Total number of institutions, 45.

USES FOR SPACE PLATFORMS

Senator ANDERSON. I have only a question or two. You mention on page 4 a fair-sized astronomical telescope on a space platform. Have you made any attempts to calculate the amount of lift that you would have to have in your engines to get thrust enough to lift a reasonable-sized space platform up into space and orbit it there?

Dr. WATERMAN. This is a rather more distant phase of our present thinking. There have been estimates made of this. I haven't the figures at hand.

Of course, it would involve a very much higher lift than we have at the present.

Senator ANDERSON. It would require possible nuclear propulsion. I am not trying to—I mean, that has been suggested. It illustrates, does it not, doctor, that if we are going to get the full picture, we are going to have to use all the tools we have in our kit.

Dr. WATERMAN. That is quite correct, yes, sir.

Senator ANDERSON. And I am glad you didn't hesitate to talk about space platforms. Somebody quit talking about one the other day and I was sorry because it is going to take these weird, wild concepts in the minds of some people in order to get this scientific job done, and I am happy that you are not afraid to do it.

You mentioned also another project that is very dear to my heart, studies concerning weather. You will recall, doctor, that some years ago we got into quite a discussion here in Congress as to the possibility of controlling the weather.

Dr. WATERMAN. Yes, sir.

Senator ANDERSON. What you are suggesting here would give us maybe not an opportunity to control weather, but at least to find out how it was made, where it was being made, and what might happen to it if we tried to control it.

Dr. WATERMAN. That is quite correct. This has two important aspects. One is it will be expected to improve very greatly our fundamental theories of weather, and it will have a direct practical bearing on weather forecasting because of the observations we could make.

Senator ANDERSON. Do you know of anything that promises more valuable returns economically speaking than this sort of research? I don't want to commit you against all the other things, so maybe we had better say it another way and say, don't you regard this as extremely promising from an economic standpoint?

I base that question, Doctor, on the fact that yesterday some people were commenting on the cotton situation in the Mississippi Delta area. It has been raining almost steadily in the Mississippi Delta area, both on the Mississippi and Arkansas sides of the Mississippi River, and tremendous loss is taking place to farmers.

Would not the opportunity to advise farmers in advance as to the anticipated weather conditions be an extremely wonderful service to the farmers of this Nation and eventually the farmers of the world?

Dr. WATERMAN. Well, as you know, Senator Anderson, scientists are usually very reluctant to make forecasts. Nowadays we depend on electronic digital computers, and so forth, for that sort of thing. But I will say this, that between the observations of the IGY in the Antarctic, which is unknown territory where we are getting meteorological observations, the global program in meteorology in the IGY and the satellite program, we have a very unusual opportunity, which I would firmly expect to be realized, of making really impressive improvement in forecasting.

The satellite particularly can do this because it can see the world as a whole, and especially the cloud cover and the movement of the storms in a way we have been unable to in the past.

So, in the satellite program this is one of the most promising things it can do, and it is very promising indeed.

Senator ANDERSON. I am happy to have you say that. I had the opportunity one time to spend some hours with Dr. Von Neumann out in rather arid country and I was thrilled by his predictions of what might happen with reference to weather control for peacetime purposes. Dr. Van Neumann also saw weather control as a great military weapon. He would have used it to produce torrential rains and bog an Army right down where everyone could pinpoint it.

Now, you mention also on page 5 the study of cosmic rays and other effects which may be damaging to the contents of space vehicles, whether instrument or human.

Don't you think that the recent discovery that there is a band out there, perhaps a thousand miles, is a very challenging discovery that we must follow up and find what it means as quickly as possible?

Dr. WATERMAN. Yes, sir. This is typical of the surprises that we may find out there which may be very important for us to know. That increase, of course, is not interpreted by the scientists as a great increase in cosmic rays but in other particles which produce damaging effects, and that we need to know.

Senator ANDERSON. And beyond that when the scientists discuss the use of free radicals for propellents, when we get into that area, we might find all sorts of products to be utilized.

Dr. WATERMAN. Yes, sir.

Senator ANDERSON. Thank you. I have no additional questions. The counsel may have.

Dr. WATERMAN. With reference to your earlier question, Senator Anderson, about this astronomical telescope, you understand, of course, that a telescope on a space platform can be a very small one and do the equivalent of a very large one on the earth's surface because it doesn't have to look through the earth's atmosphere.

Senator ANDERSON. It doesn't have to look through a dirty window.

Dr. WATERMAN. That is right. Yes, sir.

ACCEPTANCE OF GIFTS

Mr. WEISL. Dr. Waterman, Senator Saltonstall raised the question of the desirability of having public bodies accept private gifts. I want to put in the record a provision in title 42 of the United States Code authorizing such action by the National Science Foundation. It reads as follows:

> To acquire by purchase, lease, loan, or gift, and to hold and dispose of by sale, lease, or loan, real and personal property of all kinds necessary for, or resulting from, the exercise of authority granted by this act; to receive and use funds donated by others, if such funds are donated without restriction other than that they be used in furtherance of one or more of the general purposes of the Foundation.

Is that a provision in the act?

Dr. WATERMAN. Yes, sir, it is.

Senator ANDERSON. But, Doctor, the National Science Foundation is not engaged in procurement of large quantities of supplies, is it?

Dr. WATERMAN. Not at all. We are not involved in development or procurement, that is right.

Senator ANDERSON. This acceptance of gifts is for purely scientific purposes.

Dr. WATERMAN. That is right.

Senator ANDERSON. Whereas in another program the giving of gifts, as Senator Saltonstall seems to recognize, might be used to divert programs from one project to another.

BETTER INTERNATIONAL COOPERATION THROUGH A CIVILIAN AGENCY

Mr. WEISL. Dr. Waterman, you testified in answer to Senator Anderson's questions that it would be easier to get international cooperation through a civilian agency than it would be through a military agency. Do you think it would make any difference in getting cooperation from Russia and her satellites whether it was done through the Secretary of Defense or through Dr. Dryden, the head of this proposed new agency?

Dr. WATERMAN. Yes; I do feel this is quite an important distinction. My evidence will be the cooperation which has existed in the IGY itself where, to be sure, we and the Russians have not collaborated in the construction and launching of our satellites; nevertheless, we do exchange information. The idea is to tell the scientists of all countries what the satellites have observed, and what they are doing. So, especially if one confines exchange of information to a scientific program in exploration of outer space and doesn't discuss the rocket systems to get them up there, this is a very natural way for scientists to cooperate and would be much easier than if it were under the Department of Defense.

Mr. WEISL. Wasn't the United States participation in the IGY through the Vanguard directed by the United States Navy?

Dr. WATERMAN. In the Vanguard operation, the Navy had the responsibility for getting the satellite in orbit. It was the responsibility of the United States National Committee, under the Academy of Sciences—purely a civilian committee—to determine the scientific program that the satellite would accomplish, subject, of course, to the limitations that Defense had to put on it. The Department of Defense was assigned responsibility of developing and procuring the vehicle to get the satellite there and to make sure that it was in orbit. The National Science Foundation had responsibility for the coordination of the scientific program among Government agencies and in securing and administering the funds which carried the program out.

So, the only responsibility, you see, which Defense had was that really on the development and perfection of the rocket systems and the actual hardware required. The scientific program itself was in the hands of the scientists, as part of the IGY.

IGY AGREEMENTS

Mr. WEISL. Did the Russians live up to the provisions of the IGY agreement? Did they submit the information that they received?

Dr. WATERMAN. They submitted promptly the information of the characteristics of their satellites and the radio frequency on which they would broadcast. They gave the dimensions of the orbit as soon as they knew what the orbit was, and then told us what scientific observations the satellites could make, although they were a little slow about that on the first one. As for the rest of it, so far as I know, they have not given us complete information of the results of the

scientific observations made in their satellite yet, but they are living up to the terms of their agreement.

This is a rather involved process, as we are finding out. It takes a matter of months to get the signals interpreted and analyzed in a form so that these are intelligible for use, and they have, to the best of my knowledge, not given us this full information yet. But this is within the terms of the agreement.

AUTHORITY FOR INTERNATIONAL COOPERATION

Mr. WEISL. Under this proposed legislation, is there any provision that you have seen that clearly gives this proposed organization the right to engage in any international cooperation?

Dr. WATERMAN. I believe I saw in the bill a statement in section 2, on page 2, line 22, "cooperation by the United States with other nations and groups of nations in work done pursuant to this act," which is defined as a contribution to policy objective.

Mr. WEISL. You will notice in the Atomic Energy Act it specifically provides the method of cooperation and the circumstances under which cooperation can or cannot be engaged in. This act merely states an objective or a purpose but it doesn't implement that objective or purpose.

Dr. WATERMAN. As I see it, Mr. Chairman and gentlemen, there are two ways in which this international cooperation might take place.

One could be one very like the IGY program itself which would be an international cooperative undertaking to pool the findings of science in this outer space as proved by satellite observations. That would be one form, and this could come via the scientific unions and through the National Academy of Sciences and the National Science Foundation, as a matter of pure science.

And then, of course, the observations made by the agency would, if the United States agreed to this, be coordinated in that manner.

The other means of setting up a joint program would be where one is involved in the specifications, the requirements that have to be met to get a satellite into orbit and how it would travel there and what it sees by way of exploration, where it could go next, how far it could travel.

Now that, you see, is a more practical job where international cooperation might take place, and, if it took place in that area, I would say this new agency would be just the one to participate. However, I would add that no matter how this international cooperation should be set up, that this should be, it seems to me, referred to the State Department before it is carried out.

ROLE OF THE STATE DEPARTMENT

Mr. WEISL. That was my next question. I was going to ask you what role the State Department played, for instance, in the international cooperative arrangement of the IGY.

Dr. WATERMAN. Our State Department was, of course, consulted and that is in our act, and I believe some such provisions should be here, in this bill—but, of course, that is subject to the views of your committee.

Mr. WEISL. You could have international cooperation through the State Department using the National Science Foundation and other civilian agencies without creating this new agency, couldn't you?

Dr. WATERMAN. Yes. In their respective areas that is certainly possible.

CONFLICT OF JURISDICTION

Mr. WEISL. Now, suppose there was an overlapping of work between the National Science Foundation, ARPA in the Defense Department, and the new space agency. Who would make the final decision as to which agency does what?

Dr. WATERMAN. Before I answer that directly, let me just clarify this as I look at it. There are certain military requirements for outer space which are obviously under and should be under the jursidiction of the Department of Defense. Presumably they would come out with a declaration of what they thought was appropriate for the Department of Defense.

Presumably that would involve the new agency, ARPA, primarily, which gets its policy from the Secretary of Defense.

Second, the new space agency should outline its plans as to its proper functions, recognizing that certain functions would be in the Department of Defense.

The National Science Foundation similarly would state the requirements of pure science for observations that could be made from the satellite in just the sense that one makes observations from the top of a mountain or the South Pole, or somewhere, as forming a part of general science where these observations would fill a much needed gap in the whole picture.

The final decision in such a case, if the agencies could not come to any agreement, it seems to me, would have to come from the President with the advice of his scientific counsel where needed. But it seems to me that at present, with the understanding that the Department of Defense and the NACA prepare a statement to give guidelines along which to work, this could readily be handled by cooperation of these three agencies.

DEFINITION OF "SCIENTIFIC COMMUNITY"

Mr. WEISL. There is a provision, Dr. Waterman, in the bill which speaks of the "scientific community." It states that the new agency is to arrange for participation by the scientific community in planning scientific instruments, and so forth.

What do you construe this scientific community to mean? Does it extend beyond the scientific community of the United States?

Dr. WATERMAN. The phrase is usually used as a general one to denote all active research scientists, and as used generally it can perfectly well mean those of all countries. It is usually applied that way, but in this case it would naturally start with the scientific community of the United States, and then go further in basic research if this seemed appropriate and advisable. It usually is, in important fields of science, because the world authorities may be in a large number of countries. Contact with scientific communities could be made, of course, by advisory panels or committees which the agency director

might set up. They could turn to us in the National Science Foundation because we have very wide contact with our own country, particularly our own scientists; and we in turn could also, as we now do, turn to the National Academy of Science-Research Council which has a number of panels of outstanding scientists in the country. So that there is plenty of opportunity here in Washington for that kind of contact to be established. In fact these last two recommendations were contained in the President's message of April 2, which stated:

> I am also asking the National Advisory Committee for Aeronautics to begin immediate preparation of such detailed plans as may be required to prepare for the assumption by the National Aeronautics and Space Agency of the responsibilities contemplated for it. Those plans are to set forth the specific new space programs to be initiated and are to describe the internal organization, management structure, staff, facilities, and funds which will be required. The National Advisory Committee for Aeronautics is to discuss with the National Science Foundation and the National Academy of Sciences the matter of participation by the scientific community in determining the scientific objectives of our space programs. The best scientific judgment available should be utilized. Matters related to dissemination of the data collected should also be considered.

Mr. WEISL. I know that. I am speaking of this particular bill and whether or not it needs more definition to make clear what that paragraph means. Does that paragraph give unlimited authority without restriction for this agency to communicate with the scientists all over the world and tell them anything it needs to tell them?

Dr. WATERMAN. Its Director would have to do this in a reasonable way.

Mr. WEISL. I am talking about the statute, whether under this language——

Dr. WATERMAN. I mean under this language. It seems to me the Director would be expected to do this in an intelligent manner by calling in the scientists that he needs, whose advice he needs, by any mechanism that may be available, and if he should find there is an expert on some particular unclassified phase of space exploration in another country, then he would, of course, try to see if his scientists could be in touch with that man.

Mr. WEISL. I know what he could do or might do, but I am talking about what he should be required to do or what he should be defined as having the power to do under a well-considered piece of legislation.

Senator ANDERSON. Thank you very much, Dr. Waterman. I thank you not only on behalf of myself but on behalf of the chairman of the committee, and I am sure all the members appreciate your coming here. We hope that you will continue to make recommendations and suggestions to us from time to time.

The committee will recess until 2 o'clock this afternoon when it will hear from Mr. Roy W. Johnson, Director of ARPA, and Dr. Herbert York, chief scientist of ARPA.

The committee is adjourned.

(Whereupon at 12:20 p. m. the committee adjourned, to reconvene at 2 p. m., the same day.)

AFTERNOON SESSION

Senator JOHNSON. The committee will come to order.

For the information of our guests, I have the following admonition placed at my microphone:

> Senator Johnson, your mike is always on. It cannot be cut off. Watch your private conversations.

[Laughter.]

Our first witness this afternoon is Mr. Roy William Johnson, Director of the Advanced Research Projects Agency.

Mr. Johnson, I think you have a very fine name.

Mr. JOHNSON. I agree, sir.

Senator JOHNSON. We welcome you to Government service.

We are aware of your distinguished career in private enterprise and now that you are in the practical public business of exploring space, the committee is eager to hear your testimony.

With the consent of the committee, I'll insert at this point in the record a biographical sketch of Mr. Johnson.

Without objection, that will be done.

(The biographical sketch referred to is as follows:)

BIOGRAPHY OF ROY WILLIAM JOHNSON, DIRECTOR, ADVANCED RESEARCH PROJECTS AGENCY

Mr. Johnson was born in Michigan City, Ind., on September 5, 1905. He attended the University of Michigan where he received his bachelor of arts degree in 1927.

Mr. Johnson was employed by the General Electric Co. from 1930 to 1939, and Schick, Inc., from 1939 to 1942.

He was president of Post & Johnson from 1942 to 1948.

He served as a member of the War Production Board 1942–44.

He was vice president and executive vice president of the General Electric Co. 1948–58.

He assumed the position as Director of the Advanced Research Projects Agency on April 1, 1958.

Mr. Johnson is president of the American Council To Improve Our Neighborhood (ACTION, Inc.), a program for urban renewal, and is the 1958 New York City chairman of the American Red Cross fund and membership drive.

Senator JOHNSON. I understand that you have a prepared statement, Mr. Johnson.

As you choose, you may proceed in your own manner, and, at the conclusion of your statement, each Senator will have 10 minutes to ask you questions, and any counsel that desires to ask questions may do so.

STATEMENT OF ROY W. JOHNSON, DIRECTOR, ADVANCED RESEARCH PROJECTS AGENCY

Mr. JOHNSON. Thank you.

Mr. Chairman and members of the committee, it is a pleasure for me to appear before your committee to discuss the proposed bill, S. 3609.

I understand that Dr. York, who is the chief scientist of the Advanced Research Projects Agency, will follow me this afternoon.

First, I should like to preface this discussion with certain comments on the activities of ARPA and its organizational relationship with other agencies.

Since ARPA was organized on February 7, 1958, we have spent considerable time working with other DOD staffs on our assigned projects.

Our frame of reference has been the directive from the Secretary of Defense which gives to ARPA the responsibility for planning and directing advanced research projects involving space science and

technology, ballistic missile defense, and other advanced research and development as assigned by the Secretary of Defense.

Senator JOHNSON. Pardon my interruption there.

ARPA is the Advanced Research Projects Agency.

Mr. JOHNSON. That is true.

Senator GREEN. What is the DOD?

Senator JOHNSON. Department of Defense.

We have an organization down in Texas, the DOT, which is "Democrats of Texas," but this is the Department of Defense, DOD.

Proceed, Mr. Johnson.

Mr. JOHNSON. The projects which have been assigned mainly required coordination with the Director of Guided Missiles, because existing vehicles, components, and facilities must be utilized.

This method of operation is a precedent which will set the pattern for future ARPA projects.

In other words, it is not the intent to expand to a large organization that will require extensive laboratories and other facilities.

Undoubtedly, however, there will be some modification of existing facility complexes in order to keep from impairing efforts which must be applied to weapons systems.

I feel the important point is that existing organizations can be utilized. This approach not only saves valuable time but also costs much less money.

The Assistant Secretary of Defense for Research and Engineering is the staff adviser to the Secretary of Defense on all military research, development, and engineering matters. He will be informed on the activities which have been assigned to ARPA, and he will utilize the ARPA staff for technical and administrative reviews to the extent necessary to fulfill his requirements.

Another way of explaining our actions is that we have and will be assigned specific projects which we will manage and provide funds for implementation.

This method of operation is the key to the important objective to be served by ARPA.

For instance, we will have the scientific capability to review, direct, and expedite research programs which in the past have been retarded because of the requirement that they be based on a military weapon system.

The scientific capability referred to will be provided mostly by a contract with the Institute for Defense Analyses with a staff of about 25 scientists. However, many of the staff are also members of other committees such as Dr. York's membership on Dr. Killian's committee.

In this manner, we will have access to the best scientific talent in the United States to assist in the acceleration of the national technological status.

In addition, such projects as the ICBM defense may become so large in the future that it would be advisable to consider a management-type contract in order to provide a means for tying together the many diverse developments required for the overall defensive system.

Our method of operation in the Department of Defense is to deal directly with the service agency that has the capability to accomplish our projects.

This naturally bypasses many established channels but has the decided advantage of saving valuable time and money. We realize that the military service agencies are already performing important missions. However, they are in the best position to state if our projects can be accomplished without disrupting other directed projects.

If our projects can be undertaken, then ARPA will write funding orders—and are doing so—direct to the operating agency. We have already begun to function in this manner.

Some examples are the lunar probes, and the escape guidance experiment, and associated ground equipment. The Army, Navy, and Air Force all will participate in these experiments.

Of course, in addition to the service participation, ARPA coordinates with other agencies outside the DOD such as the National Advisory Committee for Aeronautics, the National Academy of Sciences, and the National Science Foundation.

The President has authorized ARPA to proceed with the projects I have just mentioned for a period of 1 year.

In furtherance of his proposal for a National Aeronautic and Space Agency, he has directed that these projects be reviewed for responsibility. Our preliminary discussions with NACA on this subject have resulted in agreement on complementary budgets for fiscal year 1959 and general delineation of projects to be jointly pursued.

Last week the ARPA presented its fiscal year 1959 fund request to the Subcommittee on Department of Defense of the House Appropriations Committee.

Of the $520 million requested, we have proposed that $448 million will be utilized for military purposes associated with missile defense, military satellites, and space technology in the fields of propulsion, instrumentation, data handling, reentry phenomena, and so on. The remaining $72 million was requested to continue the nonmilitary space projects of the type which have been authorized by the President.

All of the funds requested represent our best judgment on what we can accomplish when all factors are considered, including the present status of technology.

On this planning basis, our overall objective is to expedite those projects which are of immediate national importance and interest and, at the same time, to project ourselves into the future as far as possible on other types of research.

All of this leads me to a discussion of the proposed National Aeronautics and Space Agency, which I believe should be created with its own funds for use in pursuing its programs. However, military programs already demand the use of outer space for many uses for the protection of our country.

The legislation setting up a civilian group should not be interpreted to restrict the DOD from pursuing those programs which are critical to our national security and upon which we have already embarked. Rather, the legislation should be so worded as to insure the necessary coordination between the total military and civilian programs we must as a nation pursue.

It is clear that the Department of Defense is, and must continue to be, engaged in a long-term program of space research and development. Surely our thinking in the Department of Defense must take into account developments and potential developments 5 or more

years ahead. We have tended to identify a threat and take immediate action to meet it.

We are now faced with a wholly new situation: We cannot clearly see the exact threat facing us, for we cannot know exactly where cascading science and technology will lead us nor where it will lead the Soviet Union. We simply cannot afford to be satisfied with military weapons systems within our present capability.

We must maintain a dynamic research program leading to an unknown future. In so doing, the Department of Defense must program and develop a succession of increasingly advanced space vehicles with an eye to their direct military application. To accomplish our military ends, we must push the frontiers of scientific technology beyond our present horizons.

Such vehicles, altogether aside from their utilization for war purposes, must also be utilized for necessary technological experimentation. Within this utilization there is an increasing potential for that experimentation which transcends the immediate requirements of the Department of Defense. It is within this area that support from a civilian space agency would be most helpful.

Surely this nation, confronted with a dual Soviet threat in the political and economic, as well as the military areas, cannot afford the luxury of duplication in basic space-vehicle research and production, nor can it safely accept the degradation of a necessary military program.

I would suggest that you might wish to give thought to considering the relationship between a civilian space agency and ARPA within the Department of Defense in somewhat the same terms as that which exists today in our IGY program.

I can perhaps best illustrate this relationship in the situation that exists in our Antarctic programs:

There, the United States scientific community has established program requirements, has obtained the necessary budgetary allocations, has indicated its specific geographic needs and provided the technical personnel to complete its IGY investigations.

The Department of Defense has made available the necessary resources, including ships, planes, logistics and support personnel, along with a substantial number of scientific components. Without either of these components, the very important national and international scientific programs in South Polar regions could not have succeeded.

We are at a point today where the world stood centuries ago when Columbus sailed far beyond the horizons of his day.

Our horizons are even more distant, but we are much better prepared with the technical knowledge for exploration into the unknown than was Columbus.

The program now in development for the exploration of our atmosphere and the solar system offers tremendous challenges and more than ample opportunity for any or all who would participate.

Since I have been associated with the Government, I have become convinced that there exists within the Defense Department, as well as within the United States scientific community, a tremendous capability to meet these challenges and to take advantage of these opportunities.

As we have begun to plan, I feel sure we can approach the new era confidently and hopefully. To this end, I believe that long-range planning must be undertaken both within the Department of Defense and nationally.

I believe that this planning must be integrated by representatives from such agencies as NSF, NAS, NACA, ARPA, and others, as deemed appropriate, under the guidance and overall direction of the President's Scientific Advisory Committee.

I am certain that a high order of cooperation must exist if the national program is to be accomplished.

Existing facilities and personnel must be utilized to the maximum extent.

All available scientific talent must be marshalled and properly directed if we are to obtain the maximum benefit.

ARPA is prepared to cooperate fully in the implementation of any system that is devised in order to expedite our national technical advancement.

I believe, however, that the key to effective operation is a well-planned and coordinated effort. This must and will be a fast-moving business with daily decisions, with the dual objective of advancing our technological status and, as an end product, to maintain and increase our national security.

Admiral Clark, the Deputy Director of this Agency, and I, are prepared to answer any questions that we may or can.

LANGUAGE OF THE BILL

Senator JOHNSON. Do you participate, or were you consulted in the drafting of the so-called Johnson-Bridges bill that was submitted at the request of the administration?

Mr. JOHNSON. I was not, sir.

Senator JOHNSON. Isn't that a little unusual for one in your position—apparently from your statement the Department of Defense is now doing most of this work—to be confronted with a measure that you were not consulted about?

Mr. JOHNSON. Well, I had heard discussions of the intentions to present the bill and was familiar, I believe, with the idea that a NACA extension of activities was going to be proposed.

Senator JOHNSON. Who drafted the bill?

Mr. JOHNSON. I understand the Bureau of the Budget did.

Senator JOHNSON. I notice you appeared before the House committee and suggested a change in the wording in section 2 beginning on page 2, line 7, of the bill.

Mr. JOHNSON. I did, sir.

Senator JOHNSON. This change would have the effect of deleting, "peculiar to or primarily associated with weapons systems or military operations," in favor of, "in support of or presumed to lead to the use for national defense of weapons systems," and instead of the agency "may" act, you suggested that the "agency is authorized to act in cooperation with or on behalf of the Department of Defense if so requested by the Department of Defense."

What is your position on the wording at the present time? Do you still prefer to change the wording to that which you suggested when you appeared before the House committee?

Mr. JOHNSON. I do, sir. Congressman McCormack and I discussed the possibility of changing the word "presumed," to be "determined." I would go along with either word.

Senator JOHNSON. If the Department of Defense declares that it has a military requirement for a particular space program and that it will not concur in transfers to the new Space Agency, does not that mean that the line between military and civilian space projects is being drawn by the Department of Defense?

Mr. JOHNSON. It would not be my intent in wording to say that categorically.

Senator JOHNSON. Speak a little louder, please.

Mr. JOHNSON. It would not be my personal intent that the Department of Defense would so determine. I believe that really important here is that the Department of Defense not be precluded from going into a scientific exploration for defense reasons if it should determine this to be for the interests of national security. I prefer the positive approach to this, rather than the negative.

Senator JOHNSON. Now, we are not legislating for you alone, Mr. Johnson. We are going to legislate for a long time, I guess you hope, after you are gone. This is a government of laws and not of men. We have to be extremely careful when we write this language.

TRANSFER OF AGENCIES

As I understand section 8:

For a period of three years after the effective date of this Act the Agency, with the concurrence of the head of the department or agency concerned and with the approval of the President, may transfer to itself any functions (including powers, duties, activities, facilities, and parts of functions) of such department or agency or of any officer or organizational entity thereof which relate primarily to the functions of the Agency as set forth in section 6 hereof.

That requires two things. It requires the concurrence of the agency and requires the approval of the President. Is that correct?

Mr. JOHNSON. That is my understanding, sir.

Senator JOHNSON. Now, if you want to transfer one project out of the place you already had it in in the Department of Defense, you couldn't get it out if the Department of Defense didn't want to let it go, could you?

Mr. JOHNSON. That is right, sir.

Senator JOHNSON. Then the Department of Defense would, in effect, be the agency that would draw the line between civilian and military space projects by its decision, wouldn't it? It would be the decision-making agency on all projects within the Department of Defense?

Mr. JOHNSON. That is right, sir.

QUESTION OF AUTHORITY FOR MILITARY SPACE PROJECTS

Senator JOHNSON. You have stated that—

The legislation setting up the civilian group should not be so worded that it may be construed to mean that the military uses of space would be limited by a civilian agency. This could be disastrous.

Is that a correct quotation?

Mr. JOHNSON. That is a correct quotation.

Senator JOHNSON. Does this mean that both ARPA and the new Space Agency will engage in basic and applied research in astronautics?

Mr. JOHNSON. It could very well be that the requirements for military science exploration could, timewise, be different than the scientific fraternity necessarily pursues. I could, for example, believe that the scientific fraternity might want to use some experiments in space with regard to medicine, which might not be in time of the same interest to the military. The military, on the other hand, may want to conduct experiments about the climate for a man in space, for a military mission, and the demand for scientific investigation in that direction might be ahead of that which the scientific fraternity might necessarily want. I think it is a matter of timing.

Senator JOHNSON. In your opinion, is it desirable to centralize ARPA's powers in the Defense Department?

Mr. JOHNSON. ARPA was set up within the Defense Department to work on those projects as assigned by the Secretary where there was an interest on the part of all three services and a possibility of conflict. The effort here was to get a coordinated program, and we have two projects of that nature assigned to us, one on space scientific technology which was of interest to all three agencies. Each had its own program. There could have been duplication. Our effort is to prevent that duplication through coordination. In the interest of ballistics missile defense, here, too, it was felt necessary to get out into basic research and do it in one spot. There will be other projects from time to time, for the same reason.

Senator JOHNSON. In your opinion, would it be desirable to let each service do all its own weapons research? I gather not.

Mr. JOHNSON. I believe in most cases, each service, where it had a clean-cut mission, should do its own. I believe the number of projects assigned to this Agency should be few, and not for any long period of time.

Senator JOHNSON. If it is desirable to centralize this power in the military or Defense Department, does it follow that it shall be desirable to centralize space research in the new Agency?

Mr. JOHNSON. You might, sir, prevent some waste. My concern, however, is that a military problem is a fast-moving one, and whether civilian-oriented people would be alert to the weapons spectrum possibilities, to the kind of thing that Russia might throw at us on a surprise basis. That would be my concern. I think military-trained people are most likely to be exploring the science technology in the terms of weapons, and probably be ahead of the Russians if we continue along the lines we are now going. I would be concerned if a civilian agency, without a military background, were to have such a capacity.

Senator JOHNSON. Do you approve of the present relationship between the Department of Defense and the Atomic Energy Commission?

Mr. JOHNSON. Yes, very definitely. I think it is a fine relationship.

Senator JOHNSON. The Atomic Energy Commission is given by statute the power to develop research in atomic weapons for the Department of Defense, is it not?

Mr. JOHNSON. That is correct.

Senator JOHNSON. Would you agree to a change in the act transferring this power to the Department of Defense?

Mr. JOHNSON. I would not, sir.

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Senator JOHNSON. Would you recommend giving the Space Agency the power to do all the research and development of weapons for the Department of Defense, then?

Mr. JOHNSON. I would not, sir.

Senator JOHNSON. How do you reconcile those two positions?

Mr. JOHNSON. I think we have two quite different problems.

Senator JOHNSON. Would you elaborate on that?

Mr. JOHNSON. I think we have in the space situation many more complex things that we do not know about and we must learn more about. I think we have in outer space a new possibility of attack from an enemy. I think that in space we are involved not only with a new atmosphere to work in, we are involved with a whole new system of transportation, and I think in nuclear energy we have a narrower, a much narrower thing to deal with.

Senator JOHNSON. Aren't you saying, though Mr. Johnson, that you approve of the Atomic Energy Commission's developing weapons for the Department of Defense, but you are not willing to trust the Space Agency to develop weapons for the Department of Defense?

Mr. JOHNSON. I repeat that if it were a simple matter of developing weapons—it is much more complex than weapons. I might put it this way, sir. If you were to ask me in 1900 would it have been wise to have placed all aircraft——

Senator JOHNSON. That was 10 years before I discovered America.

Mr. JOHNSON. If you were to have put all aircraft in the hands of a civilian agency, I don't believe we would be where we are today in aircraft development, and I think we have a very parallel situation here. I think the development of the aircraft industry had so many peculiar problems, such a wide complex of problems, compared with the problem of nuclear energy, that we would be in that kind of a situation if we turned space over to a civilian agency.

Senator JOHNSON. You don't think we made a mistake when we passed the Atomic Energy Commission Act, but you do not want to emulate it and follow the example we set then.

Mr. JOHNSON. I think this is one way to do it. I won't argue the point. I suspect it could be done this way. Maybe it is worth a try, but I do believe that there is no parallel.

Let me say this, Mr. Senator. If the Atomic Energy Act had been set up on atoms for peace at that time, that had been the whole pitch, then I don't believe that Congress would have appropriated the money, nor do I think that the country would have supported it to the degree that it was supported. If a civilian agency is set up on the basis of space for peace or space for fun, then I don't believe—I think the parallel is there, and I think that it has to be set up with a military connotation, with a full understanding on the part of the public that this is a threat. This isn't something we can sweep under the rug by just saying that it is civilian and it is something that, by saying it is civilian, we can then decide is not a threat. I think we have to realistically face up to a new threat that has been presented to us.

Senator JOHNSON. My time is up. I have several questions I want to ask, but I'll defer them to the second go-round.

SUBMISSION OF STATEMENTS BY WITNESSES

First of all, I have a suggestion from Senator Anderson that we ask the witnesses that are to appear before the committee to prepare as far in advance as possible a statement of the testimony they expect to give so that the members of the committee may have an opportunity to study it—24 hours in advance, if that is possible.

There is a provision of the Reorganization Act that reads as follows, and I should like to insert this in the record:

SEC. 133. (a) Each such standing committee shall, so far as practicable, require all witnesses appearing before it to file advance written statements of their proposed testimony and to limit their oral presentation to brief summaries of their arguments. The staff of the subcommittee shall prepare written digests of such statements—

And so on.

The chairman thinks the suggestion from the able Senator from New Mexico is a good one. I would like to see it followed as far as is practicable.

During the lunch hour, Senator Anderson made a little check of the various committees, Agriculture, Finance, Foreign Relations, Government Operations, Interstate and Foreign Commerce, Judiciary, and so on, and he finds that none of them follow the suggestion literally, although all of them do express the hope that witnesses will at least have a prepared statement to present before the committee. The Chair would like to instruct the staff to contact all expected witnesses and ask them to submit a written statement in advance so far as is practicable. If that does not meet the pleasure of the committee, we'll give further instructions later.

I express my appreciation to the Senator from New Mexico.

Do you have any questions, Senator Hickenlooper?

Senator HICKENLOOPER. Inasmuch as I have just come in, I have been engaged in reading Mr. Johnson's statement, and I'll defer my questions until later.

Senator JOHNSON. I'll recognize Senator Green.

INTERNATIONAL COOPERATION AND PLANNING

Senator GREEN. Mr. Johnson, toward the end of your paper that you read, you go into such things as uniting the agencies of the Government in common work. Let me read you what you said:

I have become convinced that—

reading from your prepared statement now, you say—

I have become convinced that there exists within the Defense Department as well as within the United States scientific community, a tremendous capability to meet these challenges and to take advantage of these opportunities.

That is not only within the Defense Department and within the United States, but also within some other countries in the world; is it not?

Mr. JOHNSON. That is right.

Senator GREEN. You go on, then, to say:

As we have begun to plan, I feel sure we can approach the new era confidently and hopefully. To this end, I believe that long-range planning must be undertaken both within the Department of Defense and nationally.

Why don't you add "internationally"?

Mr. JOHNSON. I suspect that the reason I did not was that I am not sure how to organize an effort internationally that would be at this time productive. I certainly am for such an organization if it can be integrated properly into our own planned program.

Senator GREEN. Have you any objection to inserting in your statement those words, "and internationally"?

Mr. JOHNSON. I have not.

Senator GREEN. Would you do so?

Mr. JOHNSON. I will.

Senator GREEN. You go on:

I believe that this planning must be integrated by representatives from such agencies as NSF, NAS, NACA, ARPA, and others, as deemed appropriate, under the guidance and overall direction of the President's Scientific Advisory Committee. I am certain that a high order of cooperation must exist if the national program is to be accomplished.

This program relates to the whole earth; does it not? Would that international program be accomplished, if you put in the word "international" above?

Mr. JOHNSON. Sir, I doubt personally if it could be really an international program. I devoutly hope so, but in the state the world is in now, it seems to me it would be almost impossible to get all the nations of the world to agree.

Senator GREEN. International doesn't necessarily mean all the nations of the world. It might mean one or two of the nations; might it not?

Mr. JOHNSON. If that is the meaning, I certainly think it would be quite proper for one or two of those countries customarily associated with us to join with us in this effort, and we could call it international.

Senator GREEN. You go on to say, "Existing facilities and personnel must be utilized to the maximum extent," but they are not utilized to the maximum extent, are they, if you limit it to one country?

Mr. JOHNSON. Well, if by "country" you are talking about the United States facilities, I was implying the United States facilities could be utilized to the maximum extent. I suspect our present facilities are being used to the maximum extent in this respect. Any instrument in space involves rockets. We are short of rockets. I think we are straining to the maximum degree to get the maximum number of ballistic missiles, as well as to support our own national program in space exploration. We could not at this time undertake to accept commitments from other nations to join this experimentation without taking rockets away from the stockpile that is needed for the ballistic missiles defense of our country.

Senator GREEN. But all nations of the world are interested in matters connected with outer space, are they not?

Mr. JOHNSON. There exists, undoubtedly, and we know specifically within the IGY—the International Geophysical Year—we did cooperate. We are cooperating with the other nations of the world. We are spending this year about $110 million of American money to support an international program in space exploration in which we are cooperating with many, many other countries of the world.

Senator GREEN. Isn't it even more important when it comes to this stellar space that we have in mind, this legislation?

Mr. JOHNSON. Sir, the $110 million I referred to is in exploration of the air outside of this world.

Senator GREEN. Don't you think that matters relating to this earth of ours are more important than, or as important as, international scientific efforts?

Mr. JOHNSON. I think this country should welcome other countries that want to join with us.

Senator GREEN. I don't understand your last sentence. Can't you say yes or no?

Mr. JOHNSON. Yes, sir.

Senator GREEN. It is equally important?

Mr. JOHNSON. Yes, sir.

Senator GREEN. Well, now, in this proposed legislation, is that taken into consideration?

Mr. JOHNSON. Yes. There is a clause in the bill in the language that permits or specifies such cooperation. The mechanics of accomplishing this are not clear in the bill.

Senator GREEN. But there is nothing here to encourage it, is there?

Mr. JOHNSON. Well, I wouldn't know whether—there is nothing here to discourage it. I can't say positively that there is anything to encourage it, either.

Senator GREEN. The fact that I find it difficult to get you to admit in your own case seems to indicate that other people will not have broadminded views unless the language is changed. What do you think?

Mr. JOHNSON. I believe that it would be appropriate to change the language to encourage other nations of the world to participate in terrestrial exploration with us; yes, sir.

Senator GREEN. Then you ended up with rather moving words:

> I believe, however, that the key to effective operation is a well-planned and coordinated effort.

I think you will agree there will be effective effort by the whole world, or so much as they are able. To continue:

> This must and will be a fast-moving business with the dual objective of advancing our technological status and, as an end product, to maintain and increase our national security.

Why do you limit it to national, then? Don't you mean the world, international security? Don't you think so?

Mr. JOHNSON. Well, sir, I feel that at this particular point in time, the thing to concern ourselves with is free world security. I do not believe it is possible within the present area of our problem to really get at international security until we are able to get the Soviet groups into a better understanding with us.

Senator GREEN. Well, wouldn't it carry out your ideas better if you struck out the word "national" from that?

Mr. JOHNSON. Sir, I am a member of the Department of Defense, and I am greatly concerned with this matter of national security. I honestly believe if we encourage Russia at this time to join with us, we would get from the joint effort—we would give everything to them that we get out of the joint effort, but I'm not sure we would get everything from Russia that they secure in this science and technology. I would be concerned that they would, in addition to what they secure from us, obtain other knowledge not available to

us and thereby make them superior in this scientific knowledge that would affect our national security.

Senator GREEN. I'm informed that my time has expired.

Thank you very much.

While I was asking questions, I understand that I have inherited the responsibility of presiding. I didn't realize it at the time. I had expected to leave as soon as I stopped.

Mr. Bridges, have you any questions?

Senator BRIDGES. I have.

Mr. Johnson, in preparation for the questions I wish to ask, I want it understood that while I am one of the authors of this bill, together with the distinguished chairman of the committee, Senator Johnson, nevertheless, introducing it, doesn't necessarily mean that I concur with everything in it. I think that it falls short of all that it seeks to accomplish.

DETERMINATION OF MILITARY OR CIVILIAN RESPONSIBILITY

Now, one of the things that concerns me the most is that while I am for civilian control, yet I don't want the military to be eliminated from it. I want the military to play an important part in it. In one section of the bill, I notice that in this supervisory Board, only one man from the Defense Department is guaranteed a place on the Board. That, to me, should be corrected.

Now, the lines of authority are not satisfactory to me. For instance—and I asked Mr. Quarles this same question this morning—supposing the new agency needed 4 Atlas missiles for space exploration, but the Air Force says, "We need those 4 primarily for the defense of the country." Now, who is going to decide who shall receive these missiles?

Mr. JOHNSON. The only place, of course, is within the Executive.

Senator BRIDGES. And the Executive is loaded up with too many duties now, as you well know. But that is a weakness and you are directed right back to the President, who acts as the umpire, the referee, on all these things.

Now, who, in your opinion, would be the proper authority to determine whether a particular project should be handled by the Space Agency or by the military agency of which you are the head? To whom do we turn to make this determination?

Mr. JOHNSON. Sir, I believe under the terms of the present language, there would be, of necessity, disputed areas that would have to go to the Executive to be answered. I would like to amplify that by saying that I would hope that in drafting this legislation, the language would be cleared up to a point where the Department of Defense, in the interest of national security, would not be precluded from engaging in scientific research anywhere that they feel might lead to a better posture with regard to our defense to develop a weapons system that would make obsolete that which we now know. I think to pick out one area of science and say you can only go so far is dangerous. I believe the military people must be able to explore all areas of science and must authorize research on their behalf, even though they do not know where that research will lead to in terms of a military benefit. This is inherent, I think, in the reason why the Secretary of Defense set up the Advanced Research Projects

Agency. I think it is his very strong feeling, and I believe in the Reorganization Act it is his strong conviction, that the research efforts of the Military Establishment must be stepped up; we must be looking ahead 5, 10, and 20 years. We must not be in the short span of planning period any longer in the area of research.

In think in space science we have a very new kind of research that the Department must not be inhibited from exploring. If the legislation is worded in such a way that the Defense Department is not precluded from going ahead, I'm sure that they must have the cooperation of the whole scientific world; therefore, I am sure they would use these civilian agencies; I am sure they would use the NAS, and the scientific organizations I mentioned in my paper, and do so positively and wholeheartedly and prevent duplication. I do not then think that it would be necessary to have any disputes to go to the Executive for adjudication. This is the only reason I have advocated the change in language that I could not think is good. But that is my attempt, not being a lawyer, to state positively an action that could be taken on the part of the military without consultation.

DUPLICATION OF EFFORT

Senator BRIDGES. Now, as I read the bill, it says in one section that the Space Agency, may act in cooperation with or on behalf of the Defense Department. Isn't that, by its natural language, an effort to show cooperation, but there again is a great danger of duplication of the activities between the two, is there not?

Mr. JOHNSON. Sir, I feel this way, that in the field of science there is likely to be very little duplication. No scientist that I know of takes great pride in going down or following the path of another scientist. I think that they want to do parallel work, and I think this should be encouraged. I think to set up one super-duper scientific agency in any field, no matter what it is, and carve out a niche for one group and then prohibit other groups from working in it would not get results as fast.

MILITARY REPRESENTATION IN NEW AGENCY

Senator BRIDGES. Would you or would you not like to see a greater representation of the military on this agency than is set forth in this bill?

There is only one member guaranteed now. The bill said the President must appoint 1 member—at least 1 member—from the armed services to the committee. As has been pointed out, he does not have to be a military man, even. He could be just a civilian from the Department of Defense.

After all, the primary purpose of all this is the survival of the country. That is what I want to get back to and it is the Defense Department which has on its shoulders that responsibility.

Mr. JOHNSON. Senator Bridges, this is my concern. I don't believe—I said this before and will say it again. I don't think we can sweep this problem under the rug by saying it is a civilian problem. I think we have to face up to the fact that this is a new threat to our national security from an unknown area at the top of us. I think that your question, if the language is very clear that the Department of Defense is not precluded from working in this area, is uninhibited,

then I don't think it is necessary to protect the Department of Defense on the decisions of this Agency by having more representation on the board.

On the other hand, if the language is written so that this Agency actually does control all space effort and the military must work by its consent, then certainly I would strongly urge that if there are 17 members, then 9 members be military.

Senator ANDERSON. I'm not sure I understood that last language. Could the reporter read that?

Mr. JOHNSON. I'll be glad to repeat that.

The last part of my sentence was that if the language leaves unclear the status of the Department of Defense in exploring space, and if it is implicit that it must receive the approval of a civilian agency to proceed, if that is the case, then I believe that the Board should have 17 members, 9 of whom should be from the military.

Senator ANDERSON. I thought that's what I heard.

MILITARY LIAISON COMMITTEES

Senator BRIDGES. One more question, Mr. Johnson. This is a field that Senator Anderson and Senator Hickenlooper are particularly interested in. I believe there is a military liaison coordinating group working with the Atomic Energy Commission.

Is that right, Senator Anderson?

Senator ANDERSON. Yes.

Senator BRIDGES. Do you believe that by law we should create such a group in this Agency that is being set up?

Mr. JOHNSON. I think that liaison committees—within Congress, sir?

Senator BRIDGES. No, I mean should it be set up by legislation, or should we merely leave it to permissive cooperation?

Mr. JOHNSON. Oh, by legislation. I believe that a military liaison committee is a very, very helpful device. I think this would be a fine thing for the Department of Defense and this new Agency when created. I do not think it necessary to set this up by legislation.

Senator BRIDGES. It has always been my experience, having been around Washington quite a while, that everybody talks and it is very popular to talk about flexibility. That seems to be, as years go on, one of the most idealistic subjects you could discuss. My own experience is that in legislation, many times it is better to tie things down in legislation to be sure of them irrespective of those who administer them. That is the point I was getting at.

Thank you, Mr. Chairman.

Senator GREEN (presiding). I'll ask Senator Anderson if he has a question.

Senator ANDERSON. I think very few.

VOLUNTARY COOPERATION BETWEEN SCIENTISTS AND THE MILITARY

I noticed on page 5 you suggest that you might give thought to considering the relationship—

between a civilian space agency and ARPA in somewhat the same terms as that which exists today in our IGY program.

You wouldn't mean that the part that ARPA played in the IGY program would be the type of part you would play with this Space Agency, would you? Or do you?

Mr. JOHNSON. This example was an attempt to establish how voluntarily it has been and will continue to be possible to cooperate with civilian programs in the IGY program. As I stated earlier, we have spent $110 million. We allocated a good number of important rockets to assist in the program. The Navy was given the job of developing, and did a fine job in developing the Vanguard, and we did work in cooperation—the payload work was done in cooperation with the scientific societies that were interested in cooperating with us, working with us. Your consultant here, Dr. Homer J. Stewart, was active in that work and participated on one of our very important committees in directing this work. This is an example of how a military and scientific committee can cooperate.

I also referred to the IGY program in Antartica where I think we have a maximum kind of cooperation. I don't think you need to write that kind of cooperation into legislation. I think it is an inherent desire on the part of the military to work with scientific bodies and get scientific help whenever they can.

Senator ANDERSON. But in the case of the IGY program, you say the Navy selected the program. The scientific community selected the Navy to do the job, and then it went ahead with the Vanguard. We find out that the Army had a pretty good little gadget itself. The Air Force had its own project, which I have referred to many times as Project World Series, which was extremely promising. Yet we ended up with Vanguard, which I think was not supposed to be a complete test; they haven't completed anything yet of any interest.

Mr. JOHNSON. That is right. That is one of the gambles you take in developing this kind of device.

Senator ANDERSON. But didn't we get into it because somebody in the IGY program liked the approach of the Navy and went ahead and let the Navy do it, even though the Army was probably ahead in the development of missiles at that time?

Mr. JOHNSON. I think part of this was due to the desire of everybody to interfere to a minimum degree with the basic missiles program. The Vanguard was designed specifically for IGY work, and is not a part of the military arsenal.

Senator ANDERSON. But the Army made a study and submitted its bid; the Air Force made a study and submitted its bid, and the decision seemed to revolve on the idea that everybody ought to have a little piece of this, and the Navy hasn't got anything, so give it to the Navy.

Mr. JOHNSON. There will always be some errors in judgment and hindsight. I think it points out that maybe we could have done something a little different than we did. Nevertheless, the scientific fraternity was completely in support of the program and did participate in it, as a matter of fact were very active in planning the program. They went along with Vanguard. They met regularly and discussed the Vanguard program as it progressed. I think they are a little unhappy, as we are, but I don't think anything was pushed down their throats. This was a cooperative thing between the IGY and ourselves.

Senator ANDERSON. Well, it is a long story. The Navy did inherit part of the very technical group which was a very fine group, and they were available for work, I grant you. But it points out that sometimes

the outside agency might not develop as good a project as the armed services would have if they had been doing work of their own. I think that Project World Series was based to some degree on the various devices which the Army had developed, and probably had the same starting place. We'll probably have something in the air pretty soon.

I hope we don't get into a situation where they say the Army has this, the Air Force has this, and we'll give this to the Navy. I hope the second time around we don't give something without regard to what is the best agency for it.

FUNDS FOR NUCLEAR PROPULSION

You say at the bottom of page 3:

> Last week the ARPA presented its fiscal year 1959 fund request to the Subcommittee on Department of Defense of the House Appropriations Committee. Of the $520 million requested—

I presume we are going to have a chance to talk to Dr. York later. But you speak of $520 million requested:

> We have proposed that $448 million will be utilized for military purposes associated with missile defense, military satellites, and space technology in the fields of propulsion, instrumentation, data handling, and reentry phenomena.

Is any of that nuclear? Nuclear propulsion? I mean, what is nuclear in there?

Mr. JOHNSON. We do contemplate some study. Dr. York has to talk with the Commission about some study work in terms of propulsion. I think he will be glad to refer to this when he testifies on the bill.

Senator ANDERSON. Completely outside the question of nuclear propulsion is the question of airframes for Project Rover. It needs at least $1 million if the work is to be pushed at all. Your budget does not include it, does it?

Mr. JOHNSON. No, at the present time, Rover is not in our assigned work.

Senator ANDERSON. You are doing some work on Rover in the airframes——

Mr. JOHNSON. The Air Force. The Secretary of Defense has not given Rover to ARPA. That is a part of the Air Force project work.

Senator ANDERSON. I didn't know that. All right. Then I think the questions might better go to Dr. York.

I wonder why he wouldn't put them into this space agency, since Rover is a propelled rocket? Why wouldn't it follow the other rockets?

Mr. JOHNSON. It may well get there.

Senator ANDERSON. I'm sure it will. The X–15 isn't assigned yet, and it spins a minute or two in outer space at some time in its place.

Mr. JOHNSON. But it is so well along that I don't think ARPA should get into a thing like that. ARPA is in research. When it reaches the development period, it should be assigned to one of the services to carry out. Rover could very well come to ARPA.

Senator ANDERSON. All right.

Senator GREEN. Mr. Mundt, have you any questions?

Senator MUNDT. Yes; I have.

MILITARY AUTHORITY TO DEVELOP ITS OWN PROJECTS

Mr. Johnson, on page 4 I quote three sentences from the middle of the page:

> The legislation setting up a civilian group should not be interpreted to restrict the DOD from pursuing those programs which are critical to our national security and upon which we have already embarked. Rather, the legislation should be so worded as to insure the necessary coordination between the total military and civilian programs we must as a Nation pursue.

I take it that you feel that it doesn't quite do that now, and I share that conviction, but I don't want to put words in your mouth. But when you use the word "should" instead of "is," it at least whets my curiosity.

Mr. JOHNSON. I believe the wording of the bill could be improved to eliminate the gray area where there is bound to be conflict of interpretation of what is civilian and what is military. I think in writing that particular sentence I had in mind the kind of program that would involve getting man into space. I think that it is very necessary to have complete coordination with all agencies who are interested in doing this, but I do believe it is very important to allow the military agencies to participate and direct their interest so that in the event it becomes necessary militarily to have a man up there, we have paved the groundwork, and there may be different environment necessary for a man for that reason than a man who is exploring space just for fun.

Senator MUNDT. I certainly agree that anything in legislation you do to sharpen these guidelines will tend to eliminate confusion and conflict which necessitates White House adjudication.

I take it that you feel that anything this committee might do so as to spell out specifically what the general public welfare should have in mind, would be helpful to the later elimination of confusion. That is why you should, because you felt perhaps this language could be written up in more detail.

Mr. JOHNSON. That is right, sir.

Senator MUNDT. In that connection, I quote from the bill itself, the same section that Senator Bridges quoted to you on page 2, in which I raise a different question, however. In section 2, on page 2, starting with line 4, where it says:

> The Congress further declares that such activities should be directed by a civilian agency exercising control over aeronautical and space research sponsored by the United States, except insofar as such activities may be peculiar to or primarily associated with weapons systems or military operations, in which case the agency may act in cooperation with, or on behalf of, the Department of Defense.

Not only do I think that that, as presently written, sets the stage for confusion, conflict, and competition, but I don't like the fact that I read into it that the Department of Defense has been so much downgraded by that conflict and by that language in those areas in which it should have primary responsibility. It seems to me it would be better language to carry out the intent that I am sure you have in mind to say the Department of Defense should have initial authority and responsibility for those military aspects. If the word "Agency" were to be written in instead of "the Department of Defense," the Agency and the Department of Defense could act cooperatively, in which case the Department of Defense may call upon the agencies for

a cooperative action; that is, the Department of Defense should not evade its responsibilities in those areas which are primarily military.

Do you care to comment on that?

Mr. JOHNSON. I, personally—and I cannot, in saying this, speak for the Department of Defense—but, as a person, I heartily endorse the kind of language that you recommend.

Senator MUNDT. Thank you.

That's all, Mr. Chairman.

Senator JOHNSON. Senator Hickenlooper?

DIFFERENCES BETWEEN "NUCLEAR" AND "SPACE" DEVELOPMENT

Senator HICKENLOOPER. Mr. Johnson, I'm very much concerned about the division of responsibility and authority between the civilian activities and the military in this particular program.

This may be a question that is impossible to answer with any sound judgment at this moment, but, as to what we knew about atomic energy in 1945 and 1946, and what we know about the problems and the potentials of outer space in 1958, how would you say our information compares? In other words, do we, do you think, know more about the potentials and what we have to face in the problems of outer space today than we did as to what we had to face in atomic energy, say, in 1945 and 1946?

Mr. JOHNSON. Sir, in answering Chairman Johnson's question on this point, I tried to say that I believe the problems and the knowledge of nuclear physics are much more narrow than the problem of the phenomenon that we need to study and acquire knowledge in with regard to outer space. My guess is that it is going to take many, many years of exploration. It is going to involve the sciences across the entire spectrum. This will be one of the broadest pursuits of knowledge that the world, I think, has ever undertaken.

I do not want to depreciate the importance of the nuclear job that has been done—atomic energy—but I do not believe that we are dealing with the same kind of phenomenon, nor are we looking at the same kind of problem.

I also believe that, if we examine this legislation, we are looking at really the problem in the air, all the air 1 inch above the floor and to infinity. This, I think, is a broad problem. This even broadens the problem, and, I believe, implicit in what I am saying is that a management successful in nuclear energy—and it has been successful; I think it has been eminently successful from every viewpoint—that pattern of success does not necessarily mean that such a pattern of management would be successful in the field of air, wherever it exists.

Senator HICKENLOOPER. Well, then, as I understand it, you believe that we probably had a little better perspective of where we were going in the foreseeable future in 1946 in atomic energy than we have today in outer space because of the expanded problems and potentials?

Mr. JOHNSON. I believe that is a correct statement, sir, of my attitude.

Senator HICKENLOOPER. Now, we are dealing here with legislation. We are originating, or hope to originate, legislation which will assist us in meeting this problem. I call your attention to the fact that, after

a great deal of study, an Atomic Energy Act was written in 1946. That act has had several substantial revisions in which, over the years, the basic policy of the act has in great degree been reoriented because of the things that happened since 1946; international affairs, advancement of the arts, and objectives, and all of those things. I am just wondering how meticulous we can be in this particular legislation that we are working on now as to the future.

Should we attempt to write a specific and detailed guideline to take us far into the future in this legislation, or shall we approach it with the idea that, very likely, it will have to be reapproached before too long, probably some very substantial modifications adopted as we learn things about it?

Mr. JOHNSON. Oh, I couldn't agree with you more completely. I think this is exactly the situation we are in. We cannot anticipate our management problem or have anywhere near a complete total program for even 10 years, at this time. We will learn much more than we know now.

CONSIDERATION OF MILITARY AND CIVILIAN INTERESTS

Senator HICKENLOOPER. Now it is for that reason, in some degree, that I am concerned about what we do or do not do, either to the civilian end of this program or to the military end; and I think we have got to exercise care that, in charting the original course in this legislation, we do not do violence to either of them. But, on the other hand, we should have the proper perspective of both the civilian and scientific exploration from the standpoint of purely civilian use, economic use, and so on; that that will not destroy the military necessity or military development that is essential to our security, or, on the other hand, that the military should not get the controlling hand and completely subordinate civilian scientific development to temporary or emotional or other military controls.

I think it is a very difficult problem. I do not know that I fully understood your statement as to whether you advocate a system of coordination of these various interested groups in this matter as a sort of loose coalition or whether you are advocating one central authority group or individual, with proper safeguards worked out for various military and civilian phases. I say I am unclear on that.

Mr. JOHNSON. My position, personally, is that it would be at this time completely wrong to have one overpowering controlling agency that ruled all scientific exploration in space. I believe there is room for, and there should be, a civilian agency that can proceed with scientific experimentation for any scientific reason that appears to be sound for just gaining new knowledge. I think there should be a military agency that is permitted equal freedom to gain knowledge connected with military science that is needed to further its charge to defend the security of the country. I do not believe the military should be impeded in pursuing this course.

MILITARY LIAISON COMMITTEE IN THE AEC

Senator HICKENLOOPER. Well, I again want to refer to the problems which we have had in the atomic energy field. I call your attention to the fact that some of those problems were met by such devices, for

instance, as recognizing the civilian-control features of atomic-energy programs and developments, emphasis on peacetime uses, and yet the military phases were guarded by several devices. First, the power was put in the President to determine how many military weapons would be produced annually in the laboratories of the Commission or their contractors. The power was put in the President to determine the number of weapons, if any, to be delivered into military custody or in joint custody.

A military liaison committee was set up which had certain legal rights. It was a military liaison committee which had a right of appeal and it could go through the various channels to the President in determination of a question, when the military liaison committee believe that something that was being done, or something that was not going to be done, was inimical to the security of the United States.

Now, those devices were set up in order to safeguard the military.

Well, I am told that my time has expired, Mr. Johnson.

Senator JOHNSON. Go ahead, Senator. Finish your statement.

SAFEGUARDS AGAINST CONFLICTS

Senator HICKENLOOPER. I am just wondering if we can work out in this legislation some such adequate safeguard, especially since we are pioneering. We are pioneering in this legislation, as we were pioneering in atomic energy.

I wonder if safeguards, in your opinion, can be worked out so these programs can go along without interfering with or slowing down each other?

Mr. JOHNSON. Sir, I think that any management concept over a program of any kind can succeed, no matter how it is organized, if people of good will get together and agree on common objectives. I think that this is one way to do it. But I repeat that the decisions that the President would have to make or an associate of his, who would have to be conversant in complete detail with all parts of the activity, those decisions would have to be made every hour on the hour, really. Already we have only been on this job in this agency a matter of weeks. The kind of decisions that must be made, for security reasons cannot be revealed here—but they are literally being made every hour on the hour; and there are many areas where I am quite sure you could not consult with others or go through a procedure to get approval and have the program progress on a satisfactory basis.

I do think that when you are dealing with a single weapon, a nuclear or a hydrogen warhead—I do not want to oversimplify this, but again I repeat you had a different kind of problem as against a total exploration, which in my opinion will grow to a billion or two billion dollars a year, and maybe even greater. The magnitude of the dollars alone involves, I think, decisions that can be programed and discussed in an orderly way on a month-to-month basis with an arbitrating authority.

This, I think, is going to be the big division as we go down this road.

Senator HICKENLOOPER. Thank you, Mr. Johnson.

Senator JOHNSON. Senator Symington?

Senator SYMINGTON. Mr. Johnson, I am sorry that I have not been here for all of your testimony. Some time back the chairman was asking you about the atomic energy setup and about the setup incident to the military space units. If the Atomic Energy Commission handles a project with a space unit like an ICBM or something that went higher or farther, it is actually a weapon system; is it not? Therefore as the distinguished Senior Senator from New Hampshire said, it would be important for the Department of Defense not to release those things which have to do with the military assignment. Is that the way you see it?

Mr. JOHNSON. That is the way I feel, sir.

Senator SYMINGTON. I believe in civilian control, but, if you are going to do it right at minimum cost, you have to have the authority to carry out that part of the overall picture which is your responsibility; is that correct?

Mr. JOHNSON. That is correct, sir.

SECRECY OF OPERATION

Senator SYMINGTON. We have been hearing for several days about the efficiency of the Atomic Energy Commission in its relationship with the Department of Defense. I believe the Atomic Energy Commission is a fine organization. Of course, when they make a mistake, nobody knows anything about it and that, as you and I both know from business, is a rather favorable position to be in. Is that right?

Mr. JOHNSON. That's right, sir.

Senator SYMINGTON. I am a great admirer of the Army, Navy, and the Air Force, and they have had a little trouble getting their satellites up. Don't you agree it would have been easier on them if nobody had known about those phases?

Mr. JOHNSON. Yes; I would be in perfect agreement.

Senator SYMINGTON. By means of secrecy, waste and inefficiency can be hidden. However, I know that sometimes it is necessary to have things covered up in the interest of security.

OPERATION OF NACA

Do you know something about the NACA?

Mr. JOHNSON. Yes; I am somewhat familiar with NACA; yes, sir.

Senator SYMINGTON. Do you believe it is a good agency?

Mr. JOHNSON. Yes, sir; I think it has performed very well for the duties assigned to it. They have cooperated and coordinated their work with the services. I hear nothing but very fine words from the Air Force and the Navy. I think they have done well in their assigned task.

Senator SYMINGTON. Considerable attention has been directed to the proposal for NASA to change the composition of the Board from 10 Government people to 7 or 8 Government people. That would provide for one more person from private enterprise or private organizations than from Government. That could be easily corrected on this Advisory Committee by shifting one or more persons; could it not?

Mr. JOHNSON. I think so; yes, sir.

Senator SYMINGTON. I believe, incidentally, that that is a desirable shift so that there would be no question about the Government running it instead of private industry. Actually, however, inasmuch as the Committee being the authority in the NACA has been changed to the Executive Director being the authority in the NASA, the question of whether the Committee is controlled by Government people or private people is not as important as it would have been in the NACA. Is that correct?

Mr. JOHNSON. That is correct, sir.

CONTRACTUAL ARRANGEMENTS OF NEW AGENCY

Senator SYMINGTON. On the basis of this proposed law, the NASA would have a major logistic problem, would it not, of assignment of research and development contracts based on quality and price?

Mr. JOHNSON. Oh, my, yes. This is a tremendous reorganization job confronting the agency.

Senator SYMINGTON. These other agencies like the Defense Department, the Smithsonian Institute, and the Atomic Energy Commission would furnish, you might say, component parts to a whole in the way of an end product which would be primarily an aeronautical-astronautical unit; would they not?

Mr. JOHNSON. This should be the case; yes.

SECURITY IN THE NEW AGENCY

Senator SYMINGTON. Therefore, of all the Government agencies outside the Department of Defense which have done the most research work in aeronautics the President has picked the logical one, in the NACA. Would you agree with that?

Mr. JOHNSON. Yes, sir; I completely agree with the President's choice of this as a civilian agency nucleus.

Senator SYMINGTON. If there are any matters which have to be handled in secret because of the law which sometimes, I think, is unfortunate in that the situation today is nothing like it was 10 years ago when we put so much secrecy into the atomic picture; but if it has to be done that way, it could be assigned to that Agency, for example, and handled on that basis; could it not?

Mr. JOHNSON. Yes; security could be placed in that Agency on exactly the same basis as it is in the Department of Defense or the Atomic Energy Commission.

Senator SYMINGTON. Mr. Chairman, that is all that I have.

Senator JOHNSON. Senator Bricker?

Senator BRICKER. I have no questions.

Senator JOHNSON. Mr. Weisl?

RELATIONSHIP BETWEEN DEFENSE DEPARTMENT AND THE NEW AGENCY

Mr. WEISL. Mr. Johnson, in projecting the relationship between the Department of Defense and the now prospective Space Agency, you pointed to the relationship of the Department with the IGY project. Is that correct? That is the way you conceive the cooperative relationship to be with the projected or prospective Space Agency?

Mr. JOHNSON. I did not mean to imply quite that, sir. The minimum relationship with the new civilian agency should be, in my opin-

ion, that relationship which presently exists with NACA. That is the minimum and I am all for making that relationship stronger. The IGY reference was trying to bring out the fact that the Department of Defense has a history of having worked cooperatively with the various scientific societies of the country; that it has actively supported these programs in the IGY very capably. It is capable of continuing to do this in the future and thereby assure the cooperation of the scientific fraternity in the whole spectrum of science.

Mr. WEISL. I note that in the IGY project, the Department of Defense carried out all of the vehicle development for the IGY experiments, whereas the National Science Foundation and the other scientific groups concern themselves with scientific instrumentation. Is that correct?

Mr. JOHNSON. The first part of your statement is correct, sir. We did supply all of the vehicles with regard to the payloads. The Department of Defense did participate in the preparation of those payloads and worked with the scientific fraternity in determining what payloads; that is, the kind of meters and equipment that went into those payloads. It was a cooperative effort on the payload end, as well.

Mr. WEISL. The reason I asked the question is to gather whether your analogy implies that the development of vehicles for outer space would be largely in the Department of Defense, whereas the new Space Agency would be concerned primarily with scientific research of outer space?

Mr. JOHNSON. I think, sir, that is a proper statement; for a considerable period ahead we are going to have to rely, I feel, on the Defense Department vehicles to get satellites or space ships out in orbit and traveling. I think that in many cases the payloads could and should be very properly prepared by the civilian agency. There are exceptions. As I referred earlier to man in space, I think we have a joint effort there that is very important to have the environment, the capsule housing the man, to be jointly prepared.

I believe also that in the case of a million-pound or 2- or 3-million-pound thrust engine—which is certainly needed to get big satellites, big spaceships, up there—there, too, we must have a joint effort. I believe that some of these joint efforts are very clear.

Mr. WEISL. Now, in connection with the development of a ballistic missile for outer space, you have had the cooperation of many civilian agencies. There is the Radiation Laboratory, there is the Jet Propulsion Laboratory at Cal Tech, and practically every leading university in the country cooperates with the Defense Department in research and development of projects in outer space; does it not?

Mr. JOHNSON. Yes, sir; I think this is one of the marvels of this present age. I am astonished at the amount of money that is voluntarily being spent by private industry on pure speculation in space technology. We in our Agency have listened to 50 to 100 presentations of how to launch space ships; how to get to Mars; how to get to the Moon; how to do many, many things in space; how to get bigger missiles; how to get 2- or 3-million-pound thrust engines—programs that have cost millions of dollars, done on speculation by private organizations.

Mr. WEISL. I am talking about scientific experiments by civilian agencies at the expense of the Government of the United States.

Mr. JOHNSON. Oh, yes, sir; we have had many such agencies.

Mr. WEISL. You had NACA working with you at Government expense?

Mr. JOHNSON. That is right.

QUESTION OF NEED FOR A NEW AGENCY

Mr. WEISL. Now, the reason that I asked this question is this: Why do we need another civilian agency to conduct research in outer space problems when we already have not only at least 50 research agencies doing this work, but in addition have about 200 or 300 scientific committees engaged in this work? The question I ask, and it is only for the guidance of this committee, is why do we need another agency to do this limited experimenting in outer space, when we already have these other agencies engaged in that work?

Mr. JOHNSON. Well, sir, I think that NACA has made a very fine contribution in the fields in which they have worked in improving the total aeronautical science. I believe they, within their present framework, could extend that capability to improve similar efforts in outer space. They have 7,500 employees, many of whom are outstandingly capable and I do believe that if their charter were enlarged, specifically to include outer space, that they would add to our total knowledge. We would have many more capable minds directed toward this research.

Mr. WEISL. Well, we do not need a new agency to enlarge the work of the NACA. Could we not direct the NACA to engage in this work without creating a new agency? At least there you have a Board where the majority decides the policy. Here you would have a Board which would be the same Board, initially, as the NACA now has, only they would not have any vote. They would merely have the right to advise and recommend and be consulted with.

Would it not be better to just say to NACA, "You go ahead and enlarge the scope of your work by conducting research in civilian or peaceful outer space problems," without creating a new agency with a new budget, with new rivalry for power and for jurisdiction?

What is your answer?

Mr. JOHNSON. Well, now you really put me on the spot, sir. Could I defer the answer to that and give it to you in writing at a later date?

Mr. WEISL. Sir?

Mr. JOHNSON. Could I defer my answer to that and introduce it into my testimony at a later date?

Mr. WEISL. That is up to the chairman. I think the chairman would be willing to have you answer that at a later date.

Senator JOHNSON. I did not hear what you said, Mr. Johnson.

Mr. JOHNSON. I would like permission, Mr. Chairman, to be allowed to answer counsel's question by inserting it into the record of this testimony at a later date. I would like to have a little time to think of this answer in my office and dictate a reply.

Senator JOHNSON. If that is agreeable to the committee.

(See end of testimony.)

CIVILIAN FUNCTIONS RELATED TO MILITARY OPERATIONS

Mr. WEISL. It certainly is agreeable to me. I happen to be a lawyer. You said that you were not. Now, I read this legislation

and I cannot conceive of any function that this agency would do that is not related to military operations. If it is related, then under this statute, this agency would have very little to do.

Mr. JOHNSON. Well, I agree, sir, if you admit—and I strongly advance the thesis that militarily we must have the opportunity to put a man in space and study this whole space travel problem from the military point of view—if you do that, then all scientific experiments have a bearing on that. Even cosmic ray data is very important and I can conceive how there are certain experiments that might not have direct military implications. I can conceive of extra-terrestrial exploration for the next X number of years; that is, outside the area of Venus, Mars, and the stars, as being very interesting to the scientific fraternity right now and maybe not quite so imperatively interesting to the military, though in years to come it might be.

I could conceive of an area in the field of medicine—and this may be screwy—but in the weightless stage, some people have conjectured maybe you could learn something about certain diseases, if you put a man up there with certain diseases, in the weightless stage the disease would take a different pattern. Now maybe that is stretching it, but I do think there are some areas in time that a civilian attitude or guidance would be differently oriented than the military. At least, in time that would be the case. Maybe they would catch up with each other in interest and desire for knowledge at some point.

QUESTION OF NEED FOR A NEW AGENCY

Mr. WEISL. Well, the question was, don't we already have civilian agencies that can do that work? Do we need another civilian agency? Again I ask the question in light of the hundreds of millions budgeted, the thousands of personnel employed, the struggle for jurisdiction, and the rivalry for power in order to accomplish this interesting and unknown scientific research.

Mr. JOHNSON. Sir, I think that the amount of money that we spent which I think is, at the moment, on pure research in IGY, a hundred million dollars, roughly, for 1958, ought to be continued and probably added to and I think it is a question of who you want to administer that kind of exploration. Maybe you could extend the IGY indefinitely and have all of the scientific fraternity in a loosely knit group, supervising that activity; but I do think we should not say to the military, "You are responsible for all the scientific work in space," any more than we say to the military, "You are responsible for all the scientific work in solid-state physics.

You see, the reverse of this would not be good, either, because I don't think the military could possibly take responsibility for the total research efforts.

Mr. WEISL. Couldn't we say to NACA, "You are responsible for all nonmilitary scientific research in outer space"?

Mr. JOHNSON. This is exactly what I think should happen, yes, sir.

Mr. WEISL. Well, we have the NACA. Why do we need another agency?

Mr. JOHNSON. Sir, I would like the opportunity to write the answer to that in my office.

Mr. WEISL. Thank you. My time is up.

Senator JOHNSON. Are there any other questions by members of the committee of Mr. Johnson?

Mr. Johnson, I believe you agreed to supply for the record certain answers. I hope you will make a note of the information desired and I thank you very much for your testimony and for your coming here and giving us the benefit of your views.

INSUFFICIENT TIME TO STUDY BILL

I still do not quite understand how it happened or why it happened that one holding your responsible place in the Government was not consulted about this particular legislation.

When did you first see this bill?

Mr. JOHNSON. I would like to consult my calendar, sir, on that. I do recall that the bill was circulated—I am trying to refresh my memory—I would like to be able to do that, but my offhand memory is in the Department of Defense we were given a matter of 24 hours to get our comments. The circulation within the Department took a little longer than that and the ideas that we had did not, I guess, get into the draft—but a consultation procedure, as I understand it—I did not participate in a consultation procedure.

Senator JOHNSON. Is it not a little unusual in your opinion for a man who is head of the Advanced Research Projects Agency not to be consulted about legislation as far-reaching and vital in affecting his operations, as this does?

Mr. JOHNSON. Oh, my yes. I would certainly think so. I have been hired to worry about this thing and have been worrying about it for some time. I had some ideas.

Senator JOHNSON. While you are worrying about it, it looks like a bill was written and you got a bill and now it looks to me like rather a lucky thing for you that they just happened to write a bill that you liked. I assume that this bill does carry out most of your views because you have endorsed it?

Mr. JOHNSON. Well, sir, to clear up that misunderstanding, if there is one, I did not endorse the language of the bill as it is written. I have proposed corrective language in one part of it, but, on the other hand, I do endorse the idea of a civilian agency. I repeat that I do think the military should not be charged with a full assignment in all science exploration in space. I do think a civilian agency of some kind is needed.

Senator JOHNSON. Now, you feel very strongly, I assume, about this matter. Did you make your views known before the bill was finalized?

Mr. JOHNSON. Yes, sir, I did, within the Department of Defense.

Senator JOHNSON. And what did they tell you?

Mr. JOHNSON. Well, frankly, I think within the Department of Defense, up until just recently, there was a feeling that this was basically an extension of the relationship with NACA, as it existed in the past; and that there was not much concern about the language or about the change in relationship as I interpreted it in the bill.

INCREASED CONCERN OVER LANGUAGE OF THE BILL

Senator JOHNSON. Do you think that there is more concern in recent days than there has been?

Mr. JOHNSON. Oh, yes, sir. I am sure of that, sir.

Senator JOHNSON. Who is concerned?

Mr. JOHNSON. Well, I think we are going to have witnesses from the Department of Defense in the days to come and I am quite sure that they will express the concerns they have. I understand that even though we are employed within the Government that when we testify before this committee, that we are supposed to tell what we really think and of course I do not know whether I will have a job when I leave here today, but I am saying what I think.

Senator JOHNSON. I congratulate you upon your independence. Now, what do you think about this bill?

Mr. JOHNSON. I think it needs some changes, sir.

Senator JOHNSON. Substantial changes?

Mr. JOHNSON. Well, some very important language changes.

Senator JOHNSON. Would you submit to this committee your suggestions concerning each and every change that you think should be made in this bill?

Mr. JOHNSON. If you request it, sir, I shall endeavor to do that.

REQUEST FOR RECOMMENDED LANGUAGE CHANGES

Senator JOHNSON. I am requesting it because we would like to have your suggestions and we do not request them for the purpose of creating any differences. I am the author of the bill. I requested that my colleague in the minority join me that we have a completely open mind on this matter, and at least whatever mind I have is open on it; and I will let Senator Bridges speak for himself. I am sure he feels the same way. We want the information. We realize our judgment is no better than the information we can have to base it upon, and we think you are in a position to give us some information.

We do not ask you to be critical of your associates, superiors or subordinates. We just ask you to give honest answers to honest questions, and we think you can do so. If you will do that, you will make a great contribution to your country that you are so anxious to serve, or you would not be here in the position you are in.

Mr. JOHNSON. I will be happy to do that, sir.

(See end of testimony.)

PARTICIPATION IN SPACE PROGRAMS BY OTHER AGENCIES

Senator JOHNSON. What do you mean by your statement on page 6, third sentence, second paragraph:

> In development for exploration of the atmosphere and the solar system, there are offered tremendous challenges and opportunities for any and all who participate.

Are you talking about agencies of the Government or nations of the world?

Mr. JOHNSON. I am talking about the agencies of the Government. I have very strong convictions that all of the agencies of the Government want to work cooperatively in this exploration. I think we have a greater capability than does Russia. I think our only problem is how to harness this and do it in a way that is administratively sound and we can live with it over a period of years. I am tremendously encouraged since I have come to Washington with the enthusiasm everybody has to work in this field.

COMPOSITION OF NEW SPACE BOARD

Senator JOHNSON. Are you at all concerned about the language in the bill that would permit employment of 16 retired vice presidents over the country and 1 civilian who was named day before yesterday in the Defense Department to make up this so-called policy board?

Mr. JOHNSON. Well, yes, I believe that this could be improved. I do believe that if there is a Government agency, that the majority of the Board should represent Government and have their first loyalty to the Government. I believe that the Department of Defense activity in this Board or position in this Board should be improved, should be expanded.

TRANSFER OF SOME ARPA FUNCTIONS TO NEW AGENCY

Senator JOHNSON. Dr. Dryden said on Face the Nation, CBS Television Network, April 27, 1958, 4:30 to 5 p. m.—did you hear that program?

Mr. JOHNSON. I did, sir; yes.

Senator JOHNSON. Do you remember this statement?

Mr. RAYMOND. Dr. Dryden, how would you divide between the military and the civilian?

Dr. DRYDEN. This is very simple. We are engaged in discussions with ARPA at the present time to see which of the programs the President has approved will be transferred to the new agency.

I guess you held on to your chair by that time.

He goes ahead:

There is complete agreement that space science programs in their entirety will be transferred.

Were you a party to that agreement? Did you know about that agreement? Did you transfer your outfit as part of it?

Mr. JOHNSON. Sir, the background is this——

Senator JOHNSON. I don't want the background. I just want to know if you were a party to it.

Mr. JOHNSON. Yes, sir; but I would like to, if I may explain——

Senator JOHNSON. Go ahead. Elaborate.

Mr. JOHNSON. The scientific portion of the budget that we have requested of the Congress for 1959 includes $72 million for an extension of the IGY program for 1959 that would be satellites put into space to get purely scientific data, some more cosmic ray information, and that sort of thing.

We have always contended in the last 3 months that if an agency of this kind was created, it should logically be transferred. This is an extension of the IGY, and we had a letter from the President saying that part of the program he had already approved, that was scientific, should be transferred; and I do not think we had any disagreement on that. But as to the man in space, great disagreement. On that we compromised and said that is joint civilian and joint military.

I am not too unhappy about that compromise at the moment, as long as we can both do what we want to do and pursue our objectives without interference from the other. I am for cooperation and you can get the job done that you want to get done.

Senator JOHNSON. I am quoting further:

> There is agreement that reconnaissance satellites will remain in the military and certain other aspects of it, and that there be joint projects in other areas. Man in space I think will be a joint project.

There has been an agreement and you were a party to that agreement?

Mr. JOHNSON. Yes; this at the moment, I think we—in order to stop any possible in-fighting and to make sure that we get going while the Congress—and I hope that the Congress takes the time to deliberate on this one—and in the meantime our programs have to go forward. I cannot sit up there and just argue this is going to be man in space and let 3 or 4 months go by, so I am going to see to it that not one single thing is left undone while this legislation is being debated. So we, in spite of the objections of many people, have agreed cooperatively so we are meeting regularly. We met yesterday with the Air Force. There were 50 of us in the room. NASA had three representatives there on "the man in space" program. We met on meteorology. We are meeting regularly with NACA. If they get this job, they will be up to date on everything we are doing and no progress will be stopped in the meantime. This is my reason why. Anything you decide to do, we will cooperate on. We are going to make it work because the job cannot be stopped by people getting emotional or arguing over prerogatives.

INSUFFICIENT TIME TO COMMENT ON BILL

Senator JOHNSON. I agree, Mr. Johnson. Now, a final question. Do you think that the executive branch of the Government might have produced a better bill, a sounder bill, had you been given more than 24 hours to formulate your views and had tried to put them in this legislation? In other words, if you had been as deliberate as you are asking us to be, might not we have started off with a better bill?

Mr. JOHNSON. Well, I would be less than frank if I did not answer "Yes." I would be less than honest if I did not say yes. I am quite sure that we could have been helpful. I am quite sure that I personally could have contributed to some of the things in this bill that I feel would have improved it.

Senator JOHNSON. Is there disagreement on the character of weather or communications satellites?

Mr. JOHNSON. Well, you see, there are several kinds of communications. There are several kinds of weather, cloud-cover problems. At the moment I think we could cooperatively get together but as the programs become more refined, I think military communications might take quite a different road than civilian communications. It is quite possible to meteorology studying cloud cover formations from satellites and the TV cameras, that the requirements of the Navy and the Air Force, particularly, could be quite different from those of the Weather Bureau; but at the moment, at the beginning, during the first getting acquainted with the problem, it would not be wrong to have 4 satellites up there: 1 for the Army, 1 for the Navy, 1 for the Air Force, and 1 for the Weather Bureau. I don't think having one is going to last as it becomes more refined in specialized knowledge.

Senator JOHNSON. Now, when did you first see this bill?

Mr. JOHNSON. Sir, the date is not in my memory and I do not have any notes here. I will supply this for the record when I get back and consult my calendar, sir.

Senator JOHNSON. The bill was introduced on April 14, so I assume you saw it sometime before that?

Mr. JOHNSON. Yes, sir.

Senator JOHNSON. Now, you have had considerable time to deliberate, as you put it, on the provisions of this bill?

Mr. JOHNSON. Oh, yes. Yes, sir.

Senator JOHNSON. You are going to have some more time before you submit your detailed suggestions and they are going to receive the very thorough and adequate—and I trust objective—consideration of this committee.

We thank you very, very much for coming here. We may want to talk to you again.

Mr. JOHNSON. Thank you, sir. It was an honor to be here.

(The material for the record, supplied by Mr. Roy W. Johnson, is as follows:)

GENERAL COUNSEL OF THE DEPARTMENT OF DEFENSE,
Washington, D. C., May 12, 1958.

HON. LYNDON B. JOHNSON,
Chairman, Senate Select Committee on Space and Astronautics,
Washington, D. C.

DEAR SENATOR JOHNSON: Mr. Roy Johnson, Director of ARPA, and I left an executive session of the House Select Committee on Space and Astronautics at 4 o'clock this afternoon, at which time he had an engagement to fly to Massachusetts with a group of other persons on a mission connected with ARPA activities. He asked me at that time to write this letter to you on his behalf, in order to fulfill his undertaking to let you know if language was developed which was satisfactory to him to alter the provisions of S. 3609 (and the corresponding House bill), in order to meet the concerns which he had with the original language of those bills.

As a result of consideration of the matter today before the appearance of Mr. Roy Johnson before the House select committee, Mr. Johnson was able to report substantial agreement within the executive department upon the following two changes in S. 3609:

First: Strike out on lines 9 and 10 the following: ", . . . in which case the agency may act in cooperation with, or on behalf of, the Department of Defense."

Substitute for the language thus stricken out the following: "in the case of which activities the Department of Defense shall be responsible."

The whole sentence beginning on line 4, as a result of the above change, will read as follows:

"The Congress further declares that such activities should be directed by a civilian agency exercising control over aeronautical and space research sponsored by the United States, except insofar as such activities may be peculiar to or primarily associated with weapons systems or military operations, in the case of which activities the Department of Defense shall be responsible."

Second: On page 3, line 20, substitute the single word "nine" at the beginning of the sentence for the four words "no more than eight"; and also on line 23 substitute the word "three" for the word "one".

The provision thus amended, appearing on lines 20 to 23 inclusive of page 3 will, therefore, read as follows:

"(1) Nine of the members of the Board shall be designated from appropriate departments or agencies of the Government of the United States, including at least three who shall be from the Department of Defense."

Mr. Johnson testified that with these changes he believed that his expressions of possible concern had been met and that the bill as thus changed was in his judgment entirely satisfactory.

Very sincerely,

ROBERT DECHERT.

ADVANCED RESEARCH PROJECTS AGENCY,
Washington, D. C., May 19, 1958.

Mr. EDWIN WEISL,
Committee Counsel, Special Senate Committee on Space and Astronautics,
Washington, D. C.

DEAR MR. WEISL: In response to your question, "We have the NACA. Why do we need another agency?" I should like to expand on my testimony of May 7, 1958, before the Special Committee on Space and Astronautics.

I think my testimony makes it clear that I support the proposed legislation (S. 3609) for a National Aeronautics and Space Agency; although I suggested, as you know, some clarifying language.

It seems to me that the President's proposal is in effect an extension of the NACA's statutory responsibilities. In this sense, it would not be a "new agency."

I understand that one of the main reasons for new legislation is to eliminate any doubt or ambiguity in existing legislation under which NACA functions that presently could be restrictively interpreted so as to prevent NACA from expanding its work to include space research and development.

This broader concept of a national space agency, based upon the good record of the NACA, is a sound one and I share the views of those who believe that it can be organized and developed so as to help concentrate the military, scientific, and industrial resources of our country to meet effectively the challenge to leadership in this field.

Sincerely yours,

ROY W. JOHNSON, *Director.*

Senator JOHNSON. The next witness is Dr. Herbert York, Chief Scientist of the Advanced Research Projects Agency. Dr. York, will you please come to the stand and be seated at the table?

(Whereupon, Herbert York was called as a witness.)

STATEMENT OF HERBERT YORK

Senator JOHNSON. Dr. York, as background for your testimony, your biography will be placed into the record.

(Biography of Dr. Herbert York follows:)

DR. HERBERT YORK, CHIEF SCIENTIST, ADVANCED RESEARCH PROJECTS AGENCY

Dr. York was born in Rochester, N. Y., on November 24, 1921. He attended the University of Rochester, receiving degrees of bachelor of arts in 1942 and master of science in 1943. In 1949 he received the degree of doctor of philosophy from the University of California. From 1942 to 1943, Dr. York was a teaching assistant at the University of Rochester and since that time has been continuously associated with the University of California.

He became a physicist in the Radiation Laboratory in 1943, and since 1951 he has also served as assistant professor and associate professor of physics at the university. He became a director of the Livermore Laboratory in 1942.

Dr. York was appointed a member of the President's Science Advisory Committee on November 30, 1957. He is presently a member of the Army Scientific Advisory Panel and the Ballistic Missiles Advisory Committee, and a former member of the Air Force Scientific Advisory Board. He was appointed Chief Scientist of the Advanced Research Projects Agency of the Department of Defense on March 18, 1958.

Senator JOHNSON. The committee will be pleased to have any statements you care to make.

CONCERN OVER UNNECESSARY RESTRICTIONS ON MILITARY SPACE PROGRAMS

Dr. YORK. I don't have a statement of my own, separate from Mr. Johnson's. I might just say I am concerned about some of the same things that he is concerned about; namely, that in writing a bill to set up a civilian space agency that no unnecessary restrictions

are placed on the Department of Defense and its space science program. I do not have a statement. I would be glad to answer any of the same kind of questions or any other you might wish to put.

Senator JOHNSON. Senator Hickenlooper?

QUESTION OF SPECIFICITY OF LEGISLATION

Senator HICKENLOOPER. I would like to ask Dr. York if, in his opinion, we can write legislation at this time in detail as far as various phases of our problems are concerned that can be relied upon to guide us for several years, or should we attempt merely generalized legislation? Should we take a look-see and go on from there as experience unfolds?

Dr. YORK. Sir, I am not a very good one to answer that question. I am not very familiar with the legal problems and other things of that sort.

Senator HICKENLOOPER. I do not think that is a legal problem.

Dr. YORK. However, I am sure that it is not possible for anybody to foresee all of the problems that are going to arise here. I do not know whether that means you should write generalized or specialized legislation, but I am sure in a few years the problem is going to look different from what it looks today.

Senator HICKENLOOPER. In other words, what I am trying to get at is this: We could write legislation today that would channel certain functions in certain lines; in some ways get them, for the time being, at least, frozen into that pattern. It might be very difficult in the future to change those patterns that we had written into law today.

Do you think that is an element we should be considering in this legislation?

Dr. YORK. I think you should bear in mind you may very well have to change the pattern in a few years; yes, sir.

Senator HICKENLOOPER. I realize that it is a big field and we do not know just what the future holds.

Dr. YORK. Yes; space is not a field; it is a place and until we get in there and have a look around, it is kind of hard to judge what we are going to find, what problems we will be faced with, and what is the right way to handle them.

Senator HICKENLOOPER. You have stated something that is in my mind about the necessity for not freezing or attempting to freeze the pattern of this legislation in too great detail at this time; and I hope that we can find an approach that will give us the framework within which to work and still have some room for modification for the future.

I think that is all.

Senator JOHNSON. Mr. Anderson?

Senator ANDERSON. Dr. York, you know that I am very mad at you. I hated to see you leave Livermore Laboratory, more than anything in the world, because I regarded you as one of the very fine Government people and I think the contributions you made were wonderful, indeed.

Dr. YORK. I appreciate your anger.

Senator ANDERSON. I opposed the creation of Livermore originally and I was wrong because the results are very fine, indeed.

POSSIBLE TRANSFER OF NUCLEAR PROJECTS TO NEW AGENCY

Pluto, as a project, is very close to your heart. This legislation would permit it to be transferred to the new Space Agency and while you would treat it carefully and kindly, if you were over there, do you believe people who are working on Pluto would welcome that change or would they not be concerned?

Dr. YORK. Well, I should imagine that if the NACA or NASA were to become involved in the Pluto program—maybe I am expressing a wish rather than what I should be presuming, but I suppose it would go on in the way it is now, in the sense that the Atomic Energy Commission handles the nuclear problems; and, at the present time, the Department of Defense handles the nonnuclear problems.

I would suppose if NASA got into it, it would be handled in a similar way with NASA picking up only the nuclear components.

Senator ANDERSON. Pluto's Livermore Laboratory is now under the University of California; is it not?

Dr. YORK. Yes.

Senator ANDERSON. It has no problem of pay scales such as they have in general Government employment, has it?

Dr. YORK. Well, it does not have the identical problem that the NACA has at present. On the other hand, it is not as free and easy as an industrial contractor, either.

Senator ANDERSON. Oh, I grant that. I know a number of people—I do not want to get to your own personal situation—but I know a number of people who offered your opposite number, Dr. Bradbury, very substantial contracts to leave, and he left. So it is not just free and easy. Is there not some advantage in being associated with a great university, rather than being associated with a commercial enterprise, to many of these people?

Dr. YORK. In the minds of everyone there, that would be the case; yes, sir.

Senator ANDERSON. I think so, too. That has been the feeling I have had.

Now, if those are transferred to this Agency and it follows it is usual practice to farm out that research at once to Convair or North American or Aero Jet or somebody else——

Dr. YORK. Well, I think that would be a great mistake but I have not myself heard in any of the discussions with NACA that they have any such thing in mind. I agree that would be a very bad thing.

Senator ANDERSON. Well, does NACA contract very generally with universities on this type of development of aeronautical devices?

Dr. YORK. At the present time, not very much, is my understanding; but part of the purpose of this bill is to enable them to do so.

Senator ANDERSON. Don't you believe they will follow their old practices?

Dr. YORK. I think they are anxious to change their pattern in some of these ways. Furthermore, although I would go back to what I said in the first place, that I think a joint NASA–AEC program is the right way to do Pluto——

Senator ANDERSON. Oh, so do I; but there is no provision in this bill for AEC to do anything and you know from reading the newspapers that I am not trying to help any individuals on top of the AEC Commission; I am only trying to say what I truly believe, that the work

has been inspiring both at Livermore, Los Alamos, and many other laboratories.

Dr. YORK. I think it would be a great shame to change the relationships between those laboratories and the AEC.

Senator ANDERSON. I do not want to involve you where you must not testify under Bureau of Budget instructions, but don't you believe it would be well to mention AEC in the bill?

Dr. YORK. Well, to the extent that I understand it is required to mention it in order to carry out something, I guess so. But you are really out of my department here. I would not know whether this bill prohibited AEC from carrying out Pluto and Rover or not.

Senator ANDERSON. It does not prohibit it but says any time NACA wanted to take it away from them it could do so. Now, there would be quite a bit of trouble any time—the next time anybody connected with it came to the President for anything.

They would be just about compelled to go along and I do not want them to have to go along at all if they do not want to. I would like it written in the bill that even if they could take either Pluto or Rover or Snap away from AEC, with or without their consent, they couldn't move them. Now you are familiar enough with work at Los Alamos to know that the Rover project is making reasonably good headway.

Dr. YORK. Yes, sir.

Senator ANDERSON. And it seems very promising?

Dr. YORK. Yes.

Senator ANDERSON. I have talked to Dr. Schreiber and they are enthusiastic and very dedicated and work all hours on it, and I would hate to see that disturbed.

Did your people at Livermore do anything like they did at Los Alamos, where after hours they sat around and tried to dream up new types of reactors?

Dr. YORK. Yes, sir.

Senator ANDERSON. They did not get paid for that, did they?

Dr. YORK. No overtime; no, sir.

Senator ANDERSON. Well, that is why I am attached to Livermore and Los Alamos, Dr. York. Will salary be a problem in the Space Agency, do you think?

Dr. YORK. I do not really know. It depends on what kind of latitude they are given.

SALARY SCALES IN THE NEW AGENCY

Senator ANDERSON. Well, I have been trying to get permission to pay a staff member of the Joint Committee on Atomic Energy as much as he would have obtained had he remained in the Atomic Energy Commission, and I am unable to get that sort of approval through; and staff people in Government generally are a little bit jealous if one agency goes out of line. Can you imagine what would happen if the Space Agency asked for permission to pay a man $25,000?

Dr. YORK. I imagine there would be a lot of envy in other agencies.

Senator ANDERSON. Yes, sir, and you recognize that the University of California can do that in its laboratories, do you not?

Dr. YORK. It can if it wishes to.

Senator ANDERSON. I do not want to get personal, but you know that it has?

Dr. YORK. Yes, sir, I do.

Senator ANDERSON. And it was cheap at that price, I might say.

Well, that is mainly my concern—whether it is possible to take fine people and give them not an adequate reward but a better reward than if they had to go through classification systems. I do not blame Members of Congress, but somehow or other there gets to be a level beyond which salaries cannot rise and it is hard. It is a hard problem.

Mr. Chairman, I brought a man down to Washington to do a warehousing job for the Department of Agriculture when it had to try to take care of $1,400 million worth of commodities scattered all over the earth, after the Armed Forces got through with it. He was a vice president of Marshall Field, now Governor of the State of North Carolina, Luther Hodges. He spent 6 months here and said, "I've got it all solved. Here are the qualifications of the men you want. You must pay them at least $50,000." I said, "You must be crazy." He said, "Well, Marshall Field pays its men $17,000 who look after $20 million. This man will look after 70 times as much. $50,000 would be a low salary."

You know that I would not be foolish enough to try to get as much as Marshall Field paid their men. I have been worried a lot about this salary question, if you get shifted to where these universities are not able to pay a reasonable sum for the amount of talent they need.

I do not want to ask you too many questions because I realize the difficulty of your situation, just having come from Livermore, but if there is any way that you can urge that AEC is allowed to go onto some of this nuclear propulsion work, I would be happy to have you do that.

Dr. YORK. Well, I would, too. I will urge anywhere that I can that the relationship between Los Alamos, Livermore, and the Agency with regard to Rover and Pluto be left where it is, whatever may happen to the nonnuclear components of the project. I do not think that I am arguing with anybody when I say that.

Senator ANDERSON. I feel better already. I recognize you are supposed to stay within the recommendations that have been made.

NUCLEAR AND CHEMICAL PROPULSIONS

Do you think that adequate plans are being made for development of nuclear propulsion now?

Dr. YORK. Well, I think that it is somewhere near adequate. I do not really agree with the statement that you cannot put a man on the moon and get him back with chemical rockets. I think nuclear rockets are important because they can do it better and represent, so to speak, the road to the future. It is something that is coming and when it comes it will be a better way to do it; but I do not agree that you cannot do it with chemical rockets.

Senator ANDERSON. Well, I do not want to get into an argument.

Dr. YORK. You see, I am enthusiastic about both chemical and nuclear rockets. I think they can each do it. Nuclear rockets will eventually be able to do it better, but it can be done with chemical rockets.

Senator ANDERSON. The problem of takeoff and landing—where we have no atmosphere—would certainly present a problem to chemical rockets, would it not?

Dr. YORK. It would present a problem to any rocket.

Senator ANDERSON. I have a feeling that a great many scientists have pretty strong convictions that nuclear propulsion will be necessary in the long run.

Dr. YORK. In the long run it will be a much superior method. It depends on what you mean by "necessary." I do not believe it is necessary in order to get men to the moon and back. It is more difficult in the case of Mars, but I also believe you can get men out there and back with chemical fuels but it will be better and easier to do when nuclear energy is available for rockets, bigger payloads and so forth—more flexibility.

Senator ANDERSON. We had a discussion this morning about a space platform. Would you try to put up a space platform without specific impulse that comes from nuclear propulsion?

Dr. YORK. Yes, sir, I would.

Senator ANDERSON. You would? Well, you are an optimist.

Dr. YORK. I do not think I am being optimistic. I think I am just being enthusiastic.

Senator ANDERSON. I cannot draw the line between the two. I thank you for your testimony.

Senator JOHNSON. Senator Bricker?

POSSIBLE UNDUE RESTRICTIONS ON THE MILITARY

Senator BRICKER. Do you think that the terms of this bill are too restrictive on the military?

Dr. YORK. Well, again, as I said before, I am not an expert on how to read these bills and not an expert on how other people would read them. I am anxious, though, that whatever it says be said in such a way as not to limit the military to work on just well-defined military programs.

Senator BRICKER. If the terms of the bill would not necessarily restrict the military, could the operation of the new agency under this bill, do you think, unduly restrict military responsibilities?

Dr. YORK. I do not think they intend to and I do not know enough now to make legal interpretations of this bill, to be sure. I am anxious that it be written in such a way—that the experts write it in such a way—that it does not limit the military to working just on things that are for well-defined military departments.

Senator BRICKER. Do you think there ought to be an expression in the bill definitely giving military authority full responsibility in the field of defense?

Dr. YORK. If that is necessary in order to enable the Department of Defense to work unencumbered on what it regards as its problems, yes.

Senator BRICKER. Regardless of what the Director or Advisory Board might decide in the matter?

Dr. YORK. I think it is necessary for the Department of Defense to be able to go ahead with programs that it believes have a reasonable chance of fulfilling military ends; that it should be allowed to go ahead with these programs without having a civilian agency say yes or no. But I do not know what language it should be. I am only concerned that when it is all written and when it says what it is going to say——

Senator BRICKER. That that ought to be the end result of any legislation of this character?

Dr. YORK. Yes.

Senator BRICKER. Thank you very much.

ARPA GIVEN 24 HOURS TO STUDY BILL

Senator JOHNSON. When did you first see this bill in its final form?

Dr. YORK. I do not remember.

Senator JOHNSON. In any form?

Dr. YORK. I really do not know. My answer is the same as Mr. Johnson's and I do not recall, either, when that was.

Senator JOHNSON. Were you asked for comments before it was submitted to Congress?

Dr. YORK. Well, yes, that is, ARPA was asked for comments and I am part of ARPA.

Senator JOHNSON. Were you given a 24-hour deadline?

Dr. YORK. Yes.

Senator JOHNSON. You had the same time that Mr. Johnson had?

Dr. YORK. Yes.

Senator JOHNSON. What was your general reaction to the bill after you studied it in the 24-hour period?

Dr. YORK. Well, I was concerned lest it limit the military too severely; concerned about whether it limited the military in such a way that the military could not go ahead on its own with respect to military programs.

Senator JOHNSON. Do you find that concern shared by the military with whom you are associated?

Dr. YORK. I think some of them were concerned, yes.

Senator JOHNSON. What did they do about their concern?

Dr. YORK. Well, as far as the people in ARPA were concerned, we got together and talked and I do not know what to say, what we did about it. Mr. Johnson submitted some comments to the Secretary of Defense.

Senator JOHNSON. And Mr. Johnson on behalf of your group said to the Secretary of Defense, "We are concerned and here is why we are concerned. We ask for these adjustments and changes and so on"?

Dr. YORK. Yes, I do not really remember exactly what happened but I am sure that Mr. Johnson would.

Senator JOHNSON. This committee was created, I think, on February 6, and the President's message came to us April 2, so necessarily there was a short time intervening between creation of the committee and the time that the message arrived.

Do you think if there was more deliberation—more "deliberateness" as Mr. Johnson expressed it—that you could have improved on this legislation?

Dr. YORK. Well, I think that is manifestly so. I mean you can always do better if you take a little more time.

Senator JOHNSON. Do you think that is particularly true in this case?

Dr. YORK. I do not know enough of other cases to make a comparison.

Senator JOHNSON. Do you know enough of this one to know that more time would stand you in good stead here?

Dr. YORK. I think it would have been nice if we had had a little bit longer to look at it.

Senator JOHNSON. Well, you have got a little bit longer. You have had since before April 2 and the clock is still ticking and doors are not closed to you now. I am saying this to you: With that extra time, don't you think you could make some constructive recommendations that would involve statutory changes and give us a system that would serve the national interest better?

Dr. YORK. Yes; although I do not take very large exception to this bill.

Senator JOHNSON. Do you take small exception to it? What kind of exception do you take, if any?

Dr. YORK. I am concerned that when it is written or when it is finished, it not restrict the military with respect to what its, so to speak, "rights" are. I do not know that I can say that I do take a detailed exception to it because it is a matter of what is the legal interpretation of what it says. By and large, insofar as it is a positive bill for taking positive action to set up NASA and to strengthen NACA when it is turned into NASA, to give NASA certain programs, I do not take exception to it.

POSSIBLE TRANSFER OF AGENCIES WITHOUT NOTIFYING CONGRESS

Senator JOHNSON. Do you agree before a program should be changed that Congress should have a voice in the matter, even though the agency concurred?

Dr. YORK. What kind of change are you referring to?

Senator JOHNSON. Well, suppose we abolished your shop and turned it over to NACA. That's a good fresh one that we can get your answer on right quick. Suppose the Secretary of Defense said, "We want to close up this outfit and turn it over to this board of 16 vice presidents and 1 representative of the Defense Department; and we've got a lot of confusion here, a lot of committees, military liaison and all this back and forth, so we are just going to abolish Mr. Johnson's outfit completely and transfer it over." Do you think the Secretary of Defense ought to have the right to do that without consulting Congress?

Dr. YORK. That is a difficult question for me to answer. I suppose not.

Senator JOHNSON. How is it difficult? Why?

Dr. YORK. Pardon?

Senator JOHNSON. Why is it difficult?

Dr. YORK. The question should the Secretary of Defense have the right to abolish?

Senator JOHNSON. I am saying that under the bill he would have that right. That is your understanding of it; is it not?

Dr. YORK. It is not my understanding of it, but my understanding of this bill is that its purpose is to set up a civilian agency to carry out civilian programs and that it says in there the military can carry out programs peculiar to the military requirements. My concern is that this not be interpreted too strictly.

Senator JOHNSON. Now, how do you interpret this language, section 8 of the bill:

> For a period of three years after the effective date of this Act the Agency, with the concurrence of the head of the department or agency concerned and with the

approval of the President, may transfer to itself any functions (including powers, duties, activities, facilities, and parts of functions) of such department or agency or of any officer or organizational entity thereof which relate primarily to the functions of the Agency as set forth in section 6 hereof.

Now if the Agency approved it and if the President concurred in it, could it not be reassigned and retransferred?

Dr. YORK. You are better at interpreting the law than I am, if you say so.

Senator JOHNSON. What is your opinion of it?

Dr. YORK. Of whether that is what it says or whether it is proper to do?

Senator JOHNSON. You do not have an opinion on whether that could be done under this language?

Dr. YORK. I do not know whether you could do it or not.

Senator JOHNSON. Well, now, if you could do it, do you think he ought to have that authority? Do you think there ought to be some check by the Congress on the authority of the Executive to transfer these functions around helter-skelter throughout the executive department to whomsoever might be popular at the moment or whoever may be aggressive enough to take it?

Dr. YORK. Yes, sir, I think there ought to be some check.

Senator JOHNSON. All right. Do you know of any check in here?

Dr. YORK. No, but I would not know if it were there, necessarily.

Senator JOHNSON. Well, that is enough for me, sir.

Counsel?

REQUEST FOR RECOMMENDED CHANGES IN THE BILL

Mr. WEISL. I think, Dr. York, you have expert lawyers in the Defense Department?

Dr. YORK. Yes, sir.

Mr. WEISL. You do have expert draftsmen. It seems to me you ought to consult with them as to your fears about this bill, as to the lack of definition of terms, as to the possible conflict of jurisdiction between the military and the civilian and have them draft some language that you can submit to this committee that would protect the military.

Dr. YORK. That is what Mr. Johnson presumably is doing. That is not the chief scientist's job.

Mr. WEISL. I know that is not your job. That is why I say you ought to do it with your lawyers and have them give the language that will clarify any doubts you may have concerning jurisdiction and rights and duties of the military in this field. You can that, Dr. York, can you not?

Dr. YORK. ARPA can do it; yes, sir.

QUESTION OF NEED FOR NEW AGENCY

Mr. WEISL. Yes. Now, do you want to answer the question I asked Mr. Johnson? When you read this bill and read its general objectives and the delegation of general functions and in light of your knowledge of all the other civilian agencies concerned with research in outer space, do you not believe this whole object and all these functions can be accomplished by the NACA?

Dr. YORK. The bill is designed to strengthen NACA.

Mr. WEISL. Sir.

Dr. YORK. The bill is designed to strengthen NACA, is it not?

Mr. WEISL. Well, it is inclined to do it but couldn't it be done by simply giving NACA these powers, by enlarging the powers. You say they have done wonderful work. They are a civilian agency. They have worked for 43 years in the field of aeronautics and astronautics.

Why do we need a new agency?

Dr. YORK. What are you saying other than to give them all the powers in this bill but not change their name.

Mr. WEISL. Yes.

Dr. YORK. Well, I don't care whether they change their name.

Mr. WEISL. Not only changing its name but changing its functions. Instead of having the majority of the Board decide things, they have the majority of the Board consult and recommend to a Director who has the responsibility of carrying out their advice. But they have no power to decide what phase of this problem belongs to the Agency and what phase belongs to some other agency.

Dr. YORK. Well, it isn't up to the Board to decide what belongs to the Department of Defense.

Mr. WEISL. Well, unless they can do that, they can't perform any function because this bill prohibits them from doing anything that is related to military operations or military weapon systems.

Dr. YORK. Well, I wouldn't interpret that in such a way that there wasn't still plenty for them to do.

Mr. WEISL. I agree, but you don't know to what extent there is plenty for them to do because you have opinions, I am sure, from every military man that there is hardly a field in outer space that isn't related to military operations.

That takes in weather, reconnaissance, communications, and even medicine.

Dr. YORK. That is perfectly true but these things are matters of degree, and there are a sizable number of things to do in space that are certainly primarily of civilian interest, and I think that most men might agree on that.

Mr. WEISL. They might be primarily of civilian interest but they may be also related to military operations. If they are, then this Agency, Dr. York, is prohibited from engaging in that field.

NEED FOR CRITERIA TO DECIDE BETWEEN MILITARY AND CIVILIAN PROJECTS

What I say is there ought to be some definition, some criteria or some standard to decide what is civilian and what is military because unless you have that you are going to have the same thing that is happening in the Department of Defense.

In the latter situation you have even stronger language. There the National Security Act said that each department shall be "separately administered" but under the direction and control of the Secretary of Defense. Even that language, according to the President, the Secretary, and all the witnesses from the Government, was not sufficient to give the Secretary of Defense control or direction of those departments. It has led to all this interservice rivalry which has been described by a distinguished Congressman as insane rivalry. Yet that language was much stronger than any language here.

Dr. YORK. Again, I don't know how to pick the right word in a legal document but I do know that we and NACA are successfully working out what the program ought to be and who should do what.

Mr. WEISL. I agree with that. All I say is you should express your fears and doubt to the lawyers who do know how to do these things and then submit a draft to help the committee decide what should be in this legislation.

That is all I have.

EXAMPLES OF MILITARY AND CIVILIAN PROJECTS

Senator JOHNSON. Dr. York, could you give us some language or words or good working definition of what are civilian and what are good military space functions?

Dr. YORK. I can give some examples of some extremes and then there is always gray area in the middle we are trying to work out.

Examples of military space programs are the reconnaissance satellites, the early warning satellites, other things of that sort which are obviously strictly for defense purposes.

I think in my opinion things which are properly considered as civilian space programs are such things as the continuation of the IGY experiments, the earth satellite vehicles, the measure of cosmic rays, ultraviolet from the sun, ultraviolet from the stars, earth magnetic fields, and so forth, probes to the moon, probes to the planets, and so forth, things of that nature belong properly—that is, they are civilian programs.

Now there are other programs, such as man and space which I think is properly a joint program because a man—the reasons for developing capability to provide a human environment in space, to provide a capability for a man to work in space can be either civil or military requirements and it is obviously a quite expensive program and so it ought to be done as a joint program.

The same thing applies to the development of very large rocket boosters. It is going to be expensive to develop engines in the million- or multimillion-pound class, either chemical or nuclear.

It is a matter of some hundreds of millions of dollars to develop engines of that sort. They will be useful both for civilian programs and for military programs and so it seems reasonable to have a joint program on a matter like that.

Then there are other fields such as communication satellites. You mentioned those earlier yourself, where the technology that would be used is the same, whether it is for a military or a civilian purpose, but where the requirements that the satellite is designed to meet are not necessarily the same.

There may be security involved, for instance, on a military channel, and so the kind of thing we are talking about is, say, a coordinating program where the civilian agency and the military agency would each separately go about it but obviously keep together because it is based on the same kind of science.

This middle region, these joint programs, these coordinated programs, these do represent a kind of a gray area which I feel very hopeful can be worked out.

Whether you need legislation to keep it worked out, or what, I just don't know.

I do know that in dealing with the people all the while, and in NACA on a permanent individual basis, I don't experience any difficulties on these matters.

Senator JOHNSON. What standards should govern the determination of who controls the space program in your opinion?

Dr. YORK. Well, I don't think that any single agency should control the space program. Space is big enough for both civil programs and military programs, and there is no more reason to say it is all civilian or all military than it is to say that all seagoing vessels are military or——

Senator JOHNSON. Do you mean to say you should have some standard, and if so, what should those standards be?

Dr. YORK. The way I would put it—I don't know how you put it in legal language.

Senator JOHNSON. I am not a lawyer either.

Dr. YORK. The way I would put it when I discuss it with other people and the way it seems to work is to say if it is primarily for the purpose of fulfilling a military requirement, that is a military program; and if it is primarily for the purpose of fulfilling requirements in basic science or primarily for the purpose of exploring the moon or the planets, that is a civil program.

Now I don't have any trouble with those words when I discuss it with people from NACA. I don't know how you would write it so that somebody else won't have trouble.

Senator JOHNSON. Well, I think if you have the same NACA you have had all the time we may get along all right but we can't legislate this situation in perpetuity. We have got to write this thing for whoever may come. We have got to assume they may not all have the same relationship as you have.

One other question.

CIVILIAN CONTROL COULD IMPEDE MILITARY DEVELOPMENT

Does the control of the program by civilian agencies necessarily impede special military development and use of particular devices?

Dr. YORK. I am sorry. I didn't follow you.

Senator JOHNSON. Does control of the program by a civilian agency necessarily impede military special development?

Dr. YORK. If a civilian agency controlled the program and there were only one, then I think it would impede military development but that is not the way I understand it is going.

If the space program became a single program under a single authority, then I think it might very well impede the military.

Senator JOHNSON. Dr. York, I think your testimony has been quite helpful to the committee.

As counsel suggested, I hope you will spend some time with Mr. Johnson and the technicians in the drafting field in order that we can have submitted to us for our consideration the most constructive suggestions which you may be able to produce.

We very much want to have your suggestions before we finalize the bill that this committee acts upon.

The committee thanks you for your testimony and your cooperation. We anticipate the pleasure of receiving the detailed suggestions and recommendations of Mr. Johnson and anybody that he may lean upon in this endeavor.

We will adjourn until 10:30 tomorrow morning when we will hear from the Under Secretary of the Air Force, Mr. Malcolm MacIntyre.

Tomorrow afternoon we will receive testimony from the Under Secretary; the Secretary of the Army, Mr. Brucker; and the Assistant Secretary of the Navy and Air, Mr. Norton.

We thank you for your understanding and the committee stands adjourned.

(Whereupon, at 4:35 p. m., the committee adjourned to reconvene at 10:30 p. m., May 8, 1958.)

NATIONAL AERONAUTICS AND SPACE ACT OF 1958

THURSDAY, MAY 8, 1958

UNITED STATES SENATE,
SPECIAL COMMITTEE ON SPACE AND ASTRONAUTICS,
Washington, D. C.

The special committee reconvened, pursuant to recess, at 10:35 a. m., in room 457 Senate Office Building, Senator Lyndon B. Johnson (chairman) presiding.

Present: Senators Lyndon B. Johnson, Green, Anderson, Symington, and Hickenlooper.

Also present: Edwin L. Weisl, consulting counsel; Eilene Galloway, special consultant; Dr. Glen P. Wilson, technical coordinator; Gerald W. Siegel, Stuart French, and Solis Horwitz, professional staff members.

Senator JOHNSON. The committee will come to order.

Our first witness this morning is Mr. Malcolm A. MacIntyre, Under Secretary of the Air Force.

Mr. MacIntyre, as you know, this is the regular meeting day of the Senate Armed Services Committee. Therefore some of our members are necessarily at that meeting—Senator Russell, Senator Symington, Senator Bridges, and others. They will be very interested in your testimony. We are having prompt reports made. Members will be furnished with those reports, and I know that Senator Russell and Senator Bridges particularly expect to read them over the weekend. So I would like you to know that the fact that they are not here is because they cannot be in two places at once.

I am placing into the record a biography and background along with Mr. MacIntyre's testimony. I ask unanimous consent for it to be inserted at this point. Without objection it is so ordered.

(Biography and background referred to are as follows:)

MALCOLM A. MACINTYRE, UNDER SECRETARY OF THE AIR FORCE

Mr. MacIntyre was born in Boston, Mass., on January 28, 1908. He was graduated from Yale University in 1928 with a B. A. degree; from Oxford University with a B. A. and B. C. L.—Rhodes Scholar; from Yale Law School, J. S. D. in 1933, and was made a Sterling Fellow.

Admitted to the New York Bar in 1934 and the District of Columbia and Virginia Bars in 1946, Mr. MacIntyre was associated with Sullivan & Cromwell, New York, from 1933 to 1940, and with Pruitt, Hale & Coursen, New York, from 1940 to 1942.

Commissioned a first lieutenant in the Air Force in May 1942, he left the service with rank of colonel in January 1946, having served with the Air Transport Command in Washington, D. C. and various overseas theaters. He was awarded the Legion of Merit and Certificate of Commendation.

After war service, in 1946 Secretary MacIntyre became a partner in the law firm of Douglas, Proctor, MacIntyre & Gates, Washington, D. C., remaining there until 1948 when he joined the firm of Debevoise, Plimpton & McLean. He was appointed Under Secretary of the Air Force in 1957.

Mr. MacIntyre is a member of the American Bar, New York State Bar, and Virginia Bar Associations, and Association of the Bar of the City of New York. He has also been active in civil affairs as president of the Town Club of Scarsdale, N. Y., and a director of its community fund.

Senator JOHNSON. The committee is ready now, Mr. Secretary, for any statement you may wish to make in your own way. I understand you have a prepared statement?

Mr. MACINTYRE. I have, Mr. Chairman.

Senator JOHNSON. In regard to some of the scheduled witness, we are very hopeful that they can submit to us as far in advance as possible a prepared statement, in accordance with Senator Anderson's request yesterday. We will ask the staff to review those statements. If there is anything that they need to bring to the attention of the committee, they will prepare a brief digest for the committee members. We have a very limited staff, and we cannot be too rigid in that requirement, but we will follow it as far as we can.

If you will proceed in your own way, Mr. MacIntyre, we will be happy to hear from you.

STATEMENT OF MALCOLM A. MacINTYRE, UNDER SECRETARY OF THE AIR FORCE, ACCOMPANIED BY JOHN A. JOHNSON, GENERAL COUNSEL, DEPARTMENT OF THE AIR FORCE

Mr. MACINTYRE. Mr. Chairman, I appreciate the fact that the members of your committee are busy. I think quite a few of us are busy these days. I do have a prepared statement which I would like to read.

It is a pleasure to appear before you today on behalf of the Air Force. As I understand the situation, the immediate purpose of this committee is to consider legislation now before both the Senate and the House which proposes to create a National Aeronautics and Space Agency. Therefore, I will confine my remarks in a rather general vein to that subject.

On that basis, I should like to discuss briefly two areas of immediate concern. They are (1) some aspects of the military implications of space technology, and (2) comments on the proposed legislation to create the National Space Agency in question.

My first area, military implications of space technology, is a broad one—and deliberately so—because since October, when the Soviets launched the first sputnik, the subject of space as a potential avenue of attack against us has ushered in a whole new spectrum of problems and possibilities.

DIFFERENT INTERPRETATIONS OF BILL

Senator JOHNSON. Pardon me for interrupting, but could I ask you this question?

Mr. MACINTYRE. Yes, sir.

Senator JOHNSON. First, have you read the bill under consideration?

Mr. MACINTYRE. Yes, sir,

Senator JOHNSON. Have you carefully analyzed it?

Mr. MACINTYRE. I have tried to analyze it in such time as I had.

Senator JOHNSON. Have you given it deliberate consideration?

Mr. MACINTYRE. Yes, sir.

Senator JOHNSON. Do you recommend favorable action on this bill?

Mr. MACINTYRE. Yes, sir; although I have specific comments on certain features of it.

Senator JOHNSON. We are not going to stop anybody from commenting: I just want the record to show whether you appear here in favor of it, even though with serious reservations.

Mr. MACINTYRE. I appear here in favor of it, subject to reservations as to specific language.

Senator JOHNSON. Do you intend to prepare a memorandum which you will submit to the committee incorporating those recommendations or reservations?

Mr. MACINTYRE. I have no specific recommendations to make, because I am inclined to think that my interpretations may clarify the particular language.

Senator JOHNSON. If there is any language in this bill that you don't approve, I want to invite you to submit any suggested amendments to clarify that language or strengthen it or delete it or add to it, or anything else.

Mr. MACINTYRE. I think my comments will cover that area.

Senator JOHNSON. But you do appear in support of the bill?

Mr. MACINTYRE. I do appear in support of the bill in principle.

Senator JOHNSON. Now, let's don't get out on that "principle." What I want to know is are you for or against it?

Mr. MACINTYRE. I am for it, subject to my interpretation of some of the language.

Senator JOHNSON. Well, is it any different? Did somebody interpret it differently?

Mr. MACINTYRE. It could be.

Senator JOHNSON. It could be? Who?

Mr. MACINTYRE. Well, certain other people.

Senator JOHNSON. Who are "certain other people"?

Mr. MACINTYRE. I think perhaps the Bureau of the Budget might not interpret some of the words as I do.

Senator JOHNSON. Who is the Bureau? That is a pretty general term.

Mr. MACINTYRE. I can't tell you. I only know that a possible agency interpretation could be different than mine.

Senator JOHNSON. Has someone indicated to you that they have another viewpoint on it?

Mr. MACINTYRE. I understand there may be a different interpretation.

Senator JOHNSON. Whom do you understand that from?

Mr. MACINTYRE. I understand that from my discussions with other people in the Defense Department.

Senator JOHNSON. Would you specify those people? I'm going around the mulberry bush here. Do you know who wrote this bill?

Mr. MACINTYRE. I don't know who wrote it.

Senator JOHNSON. Did you see it before it was sent up here?

Mr. MACINTYRE. Yes, I saw a draft of a bill which was substantially this.

24 HOURS TO CONSIDER BILL

Senator JOHNSON. How long did you see it before it came up here?

Mr. MACINTYRE. I think it was over in the Air Force for a day.

Senator JOHNSON. Did you make any comments on it during that day?

Mr. MACINTYRE. Yes.

Senator JOHNSON. Were they in support of the bill?

Mr. MACINTYRE. They were in support of the bill subject to some changes.

Senator JOHNSON. Were the changes made?

Mr. MACINTYRE. I don't believe so.

Senator JOHNSON. In other words, the bill came to you; you were given 24 hours to consider it; you considered and made some suggestions, they didn't incorporate them and they sent the bill on up just as they sent it to you, is that right?

Mr. MACINTYRE. I'm not sure it was just as they sent it to me.

Senator JOHNSON. You are sure as far as your comments are concerned that they weren't incorporated?

Mr. MACINTYRE. That is correct, although some of the comments went to interpretation.

Senator JOHNSON. You say that someone in the Defense Department told you that someone in the Budget Bureau wrote it. Is that as specific as you can be?

Mr. MACINTYRE. That is as specific as I can be, yes.

Senator JOHNSON. Who was it in the Defense Department that told you that somebody in the Bureau of the Budget wrote it?

Mr. MACINTYRE. I couldn't say precisely, because there were a couple of people of whom I inquired at the joint meeting.

Senator JOHNSON. Who were the two?

Mr. MACINTYRE. I discussed this with Mr. Quarles and with Mr. Johnson.

Senator JOHNSON. You discussed it with whom?

Mr. MACINTYRE. I discussed it with Mr. Quarles.

Senator JOHNSON. He is the Deputy Secretary. And who else did you say?

Mr. MACINTYRE. I discussed it with Mr. Johnson and my legislative liaison people.

Senator JOHNSON. So of those three men, you don't remember which one told you that this bill now before the committee was written in the Budget Bureau?

Mr. MACINTYRE. That is correct.

Senator JOHNSON. And they also told you that there was a difference in interpretation between you and the Budget Bureau, is that correct?

Mr. MACINTYRE. Yes.

Senator JOHNSON. But you do know who wrote it in the Budget Bureau?

Mr. MACINTYRE. No, I don't.

Senator JOHNSON. And you only had 24 hours in which to consider it. Did they give you any reason why they limited you to 24 hours?

Mr. MACINTYRE. No, there wasn't any reason given.

Senator JOHNSON. What did they say?

Mr. MACINTYRE. The Air Force, as is customary when a bill comes up that perhaps may involve them, is given a draft of the bill, and there is set a time limit for comment. It happened that the time limit meant that we had to get it back at the conclusion of this particular day.

Senator JOHNSON. Is that the general practice? Do you always handle things that speedily—within 24 hours?

Mr. MACINTYRE. I can't say that it is.

Senator JOHNSON. Well, is it, or isn't it?

Mr. MACINTYRE. I wouldn't think so, "no."

Senator JOHNSON. Then the answer is "no"?

Mr. MACINTYRE. Yes, sir.

Senator JOHNSON. You are normally more deliberate about other matters?

Mr. MACINTYRE. I have found it so.

Senator JOHNSON. Do you know of any justification for not being deliberate about this one?

Mr. MACINTYRE. I don't know why the time limit was set.

Senator JOHNSON. But you do appear here in favor of the bill?

Mr. MACINTYRE. Yes, sir.

Senator JOHNSON. You may proceed.

Mr. MACINTYRE. I start with sputnik simply because it intensified national concern and symbolized a new age to which we must adjust. This national reaction stemmed, no doubt, from the insecurity almost universally felt throughout the free world.

All this, while a healthy sign, nevertheless created confusion and needed time to place our appraisal of the space age in the proper perspective. Today, our evaluations might be considered more mature perhaps because the presence of our own satellites in the sky has reassured us in a way that mere words—however factual—could never have done. At the same time, I believe you will agree with me that we must not let our meager space efforts lull us into a false sense of security.

With regard to the military aspects, this committee may possibly hear some who cannot visualize the useful military applications of space technology and who honestly believe that the ballistic missile we know today represents the ultimate in military weapons. The Air Force does not share that view.

In fact, I should like to emphasize a thought that appears to have been overlooked by some who question the usefulness of space for military purposes. I don't know what kind of weapons man will use in future space vehicles, but I do feel reasonably sure that present-day concepts and weapons will not be mated to space traversing vehicles.

No one can now foresee all of the military applications that might result from the development of space technology. Historically, it has always taken years to determine all the military applications to be derived from new advances of science. Perhaps this stems mostly from the fact that changes in military concepts, strategy, and tactics usually have to be made in order to exploit major new developments.

The current tendency to measure the military value of space flight on the basis of existing warfare concepts can lead to highly erroneous conclusions. I believe that any nation, or combination of nations, that has the capability to perform reconnaissance missions and to deliver destruction to any target on earth, while being able to deny similar capability to its enemy, will have achieved a dominant military position. Today, United States airpower, including missiles, is the free world's primary instrument in seeking this condition while operating within the atmosphere. Operations in space will play a like role in the not too distant future.

The advent of piloted and unmanned space vehicles would appear to provide the ultimate in target accessibility in both peace and war. Today, satellites can enjoy uncontested access to the space above all nations. It might logically follow that the capability to control space—or selected portions thereof—should become a vital element in insuring peace among the earth nations.

The development of space techniques will in due course provide the military with additional means of observing and striking earth targets; with the only means of destroying space vehicles; and—eventually—with the most effective means of counteracting artificial asteroids or bases on other planets. This in turn suggests that a space warfare capability on the part of the United States is vital to the survival of the free world.

We in the Military Establishment sincerely hope that all nations join together in whatever measures need be taken to insure that space is never used for any but peaceful purposes. Until such arrangements are realistically established, however, only our possession of the capability to deny control of space to aggressor nations can guarantee liberty to the free nations and insure the anticipated benefits of space to all. In a very general sense, freedom of space might be considered analogous to freedom of the seas. In the past when military capability to control the seas was exercised by peacuful nations, people everywhere profited.

My point is that we must seek out every possible means of acquiring a military capability to control space—or to deny that capability to an enemy. Unless we do this, we may well lose our present deterrent potential to an aggressor who has no inhibitions about using space for its own self-aggrandizement. At the same time, in searching out both peaceful and military useful aspects of space, we will learn more about our earth, the solar system, and the universe. And, undoubtedly, man will benefit from new and amazing discoveries. Since I am not a scientist, I will not pretend to tell you how mankind will benefit; but past history assures us that research and exploration have consistently paid off in betterment of the human race.

With that thought, let me now turn to the proposed legislation to create a national agency for research and exploration in space areas not immediately recognizable as a matter of primary concern to the military departments.

In the varied reactions that arose after sputnik's I and II, it appeared for a while that space technology might be considered a completely new science and that yet undevised agencies would have to be established to implement our national effort. I am glad to see that calmness and logic have now prevailed; and we have come to the realization that the basic tools for this task are already, for the most part, at hand in governmental agencies, science, and industry. Actually, the principal task we now face is to augment and reorient these tools in certain respects, select the most profitable avenues to pursue, provide adequate resources on a continuing basis, and coordinate properly the work of the many agencies involved.

In that respect the legislation now before the Congress calling for the redesignation, reorientation, and increased responsibilities of the National Advisory Committee for Aeronautics as the National Aeronautics and Space Agency is a most logical action.

It is logical from many viewpoints. First, because there is no clearcut division, per se, between the atmosphere and space, the NACA already is well into the astronautical sciences. Secondly, the NACA already is an operating organization and thus we need not incur the delay of creating an entirely new capability. Actually, the word "Advisory" in the NACA title has been misleading for many years. The NACA operates many laboratories and high-performance aircraft, and tests guided missiles and various components. Only a small portion of their efforts is devoted to study-type research.

The NACA truly has much to offer as a national space agency. In over 40 years, it has proved countless times a capability to accomplish highly complex basic and applied research as well as a unique capability to devise, design, and construct new research tools. Today, the NACA operates facilities worth more than $300 million, the bulk of which are applicable to space technology.

The NACA possesses a well-balanced team of competent professional personnel. They command well-deserved national respect from the Director down to the lowest level laboratory working technicians. But, perhaps even more important, they have established a fine working relationship with the military services, scientific fraternities, and industry. In my opinion, we could not make a better choice than the NACA as the foundation for our national space research and exploration agency.

Senator JOHNSON. Just a minute. Let's go just a little bit slower. I want you to repeat that.

Mr. MACINTYRE. I cannot urge too strongly that the Congress act favorably on proper legislation that will redesignate the NACA as the National Aeronautics and Space Agency and increase the scope of its mission and responsibilities in a commensurate manner. With regards to the bill now being considered by this committee, I should like to comment specifically on two of its provisions.

First, I understand the meaning of the bill is that the Department of Defense is not unduly restricted from undertaking basic research related to defense missions. The bill as now written recites in the second sentence of section 2 that this new agency would undertake all space research "except insofar as such activities may be peculiar to our primarily associated weapons systems or military operations," and then goes on to state that in this area of exception "the agency may act in cooperation with, or on behalf of, the Department of Defense." I want to make clear that our understanding of the intent of this policy expressed in the bill is that, in the broad twilight zone of dual usefulness, the two agencies should operate in close mutual cooperation with each other, under overall executive direction, without domination of either over the other, and subject always to the budgetary scrutiny and control of the Congress.

I assume secondly that the provision in section 2 that not less than one board member is to be from the Department of Defense is truly minimal and that under normal circumstances there would be more representation from the service areas to create a greater ability for formulation of a balanced approach to programs.

We are entering an era of vast technological advancements. For example, landing on the moon and travel to the planets far beyond is now only a matter of years ahead.

If we are to be a leader in this new type of exploration, if we are to maintain a strong military deterrent to global war, if we are to insure that space is never used except for peaceful purposes, then we must have both vision and tenacity. We must aggressively seek out new military and peaceful means of utilizing space.

At this point in time it is premature to distinguish definitely between what research is primarily military and what is not. In fact, the gray area of overlap is more prominent than the definites on either side. Recognizing this, we should not arbitrarily divide all specific study areas or research projects as belonging or not belonging in the military field of interest. An open mind is most appropriate here.

Regardless of how these tasks are divided, however, it will still be necessary to expend much thought, great effort, and considerable sums of money for the next several years. If we don't, we might well lose out to the vigorous pressure of international communism. If we should let them dominate space by default, then they will surely and inevitably dominate the world.

INTERPRETATION AND CLARIFICATION OF THE LANGUAGE OF THE BILL

Senator JOHNSON. Now, Mr. Secretary, with particular regard to the last part of your statement and to other parts of your statement relating to this new type of operation and the necessity of our pursuing it aggressively, I want to ask 2 or 3 brief questions for the record.

First, I observed that on page 6 you state, "I cannot urge too strongly that the Congress act favorably on proper legislation that will redesignate the NACA as the National Aeronautics and Space Agency and increase the scope of its mission and responsibilities in a commensurate manner." Do you consider this proper legislation?

Mr. MACINTYRE. I do, subject to the interpretations that I specifically mentioned immediately thereafter.

Senator JOHNSON. I would ask the staff to take the interpretations mentioned by Secretary MacIntyre and submit them to the Bureau of the Budget to determine whether the Bureau agrees with Secretary MacIntyre as to those interpretations, and if it does not, in what respect it disagrees in order that we may attempt to reconcile the different points of view.

(Statement from the Bureau of the Budget is as follows:)

COMMENTS OF THE BUREAU OF THE BUDGET ON CERTAIN STATEMENTS MADE BY UNDER SECRETARY OF THE AIR FORCE MALCOM A. MACINTYRE BEFORE THE SPECIAL COMMITTEE ON SPACE AND ASTRONAUTICS OF THE UNITED STATES SENATE ON THURSDAY, MAY 8, 1958

During the May 8 hearings on S. 3609, Under Secretary of the Air Force MacIntyre commented on two provisions of the bill and Chairman Johnson of the committee asked that the Bureau of the Budget advise the committee whether it agrees with those interpretations.

First, Mr. MacIntyre stated, "* * * I understand the meaning of the bill is that the Department of Defense is not unduly restricted from undertaking basic research related to defense missions. The bill as now written recites in the second sentence of section 2 that this new agency would undertake all space research 'except insofar as such activities may be peculiar to or primarily associated with weapons systems or military operations,' and then goes on to state that in this area of exception 'the agency may act in cooperation with, or on behalf of, the Department of Defense.' I want to make clear that our understanding of the

intent of this policy expressed in the bill is that, in the broad twilight zone of dual usefulness, the two agencies should operate in close mutual cooperation with each other, under overall executive direction, without domination of either over the other, and subject always to the budgetary scrutiny and control of the Congress."

The Bureau of the Budget agrees with Mr. MacIntyre that the intent of this policy expressed in the bill is that there should be close mutual cooperation between the Space Agency and the Department of Defense, and that both should be subject always to the budgetary scrutiny and control of the Congress. The Bureau is not sure, however, just what Mr. MacIntyre may have meant by the phrases "in the broad twilight zone of dual usefulness" or "that neither should dominate the other." It is the Bureau of the Budget's understanding that the space responsibility of the Department of Defense would include only those programs peculiar to or "primarily associated with weapons systems or military operations." All other space programs would be the responsibility of the civil space agency. We would anticipate that, after an initial shakedown period, it would be possible to draw the line between the responsibilities of the two agencies with sufficient clarity to substantially eliminate areas of possible unnecessary duplication or overlapping. We recognize that there will probably be programs of military interest which are not, however, peculiarly or primarily military. The new agency would be responsible for those programs, but we expect that the Department of Defense would participate in their planning and implementation. We are sure that a satisfactory working relationship between the two agencies can be established on this basis. Numerous features of the bill are designed to facilitate just that. Whether the foregoing interpretation of the intent of the policy expressed in section 2 of S. 3609 is in full agreement with Under Secretary MacIntyre's interpretation is difficult to say in advance of actually working with the details of the division of responsibility between the civil space agency aud the Defense Department. We believe that this division can be worked out effectively and understand that representatives of the Department of Defense and the National Advisory Committee for Aeronautics have so testified before this committee.

Under Secretary MacIntyre's second comment on which the views of the Bureau of the Budget have been asked was, "I assume secondly that the provision in section 2 that not less than one Board member is to be from the Department of Defense is truly minimal and that under normal circumstances there would be more representation from the service areas to create a greater ability for formulation of a balanced approach to programs."

We agree with this interpretation of Mr. MacIntyre and are proposing an amendment to the bill which will increase the statutory membership of the Department of Defense on the Space Board from 1 to 3.

Senator JOHNSON. Now, you pay high tribute to the NACA and its operation in the present and the past. In your opinion, is this legislation necessary for them to continue with their contribution in this field? If they are doing all this now without legislation, why do you need legislation?

Mr. MACINTYRE. I think it clarifies the authorization, Senator, and, of course, it does provide for some internal changes in the setup.

Senator JOHNSON. You believe in clarification. The bill provides for one representative of the Department of Defense on the new Advisory Board. Would you think it wise to change that 1 to 2 or 3 or 4, since you have 4 Departments—Defense, Army, Air Force, and Navy? Why don't we get that clarified?

Mr. MACINTYRE. I would hope and expect that that would result either specifically in the legislation or in practice.

RECOMMENDED AMENDMENT

Senator JOHNSON. But you wouldn't recommend it in the legislation? You would just leave it up in the air?

Mr. MACINTYRE. I would prefer that the legislation so state.

Senator JOHNSON. Would you submit suggestions along that line of what you think ought to go into the legislation for our consideration?

Mr. MACINTYRE. I think that is a matter of what number you put after the words, "not less than."

Senator JOHNSON. Would you submit suggestions on that in the form of an amendment, whether it be 1 or 3 or 4 or 6 or 8?

Mr. MACINTYRE. I would say 3 or 4.

Senator JOHNSON. Would you submit that to the committee?

Mr. MACINTYRE. Yes, sir.

(See end of testimony.)

COMPOSITION OF BOARD

Senator JOHNSON. Now, I wonder if you think it is a good policy to have the majority of the people on this Advisory Board of 17 men, come from private life?

Mr. MACINTYRE. Well, it is true that they come from private life, but, as I read the bill, Senator, they are not simply industry selections as such.

Senator JOHNSON. I didn't say industry selection, and I didn't say that they came from the North or the South. I said private life. In your opinion, is that a good public policy?

Mr. MACINTYRE. I would put it this way, Senator: The present NACA has, I believe seven. This changes that to eight. That would be more important, that change, I think, if this Board were other than advisory. The NACA Board actually is a policymaking Board that can control ——

Senator JOHNSON. How many did you say the NACA has now?

Mr. MACINTYRE. I guess it is eight. I beg your pardon.

Senator ANDERSON. It has seven.

Mr. MACINTYRE. I meant from outside of the Government.

Senator ANDERSON. How many did you say it would have?

Mr. MACINTYRE. It would have nine under this bill.

Senator ANDERSON. You said eight.

Mr. MACINTYRE. I meant that the present setup is eight.

Senator ANDERSON. The present setup is seven.

Senator JOHNSON. We seem to have a lot of different viewpoints as to what they presently have. I'm not interested in what they have at present or what they had when they were created. I'm talking about what they are going to have when this agency is set up.

Let's get back to my original question which is: In your opinion is it good public policy to have the majority of them come from private life? That is a simple question, and I hope that it can be answered simply, without discussing the background or the number or anything like that.

Mr. MACINTYRE. I think it is reasonable under circumstances where this Board is an Advisory Board only, and that majority cannot direct the Director to take its course of action.

Senator JOHNSON. You would recommend that the majority of them come from private life?

Mr. MACINTYRE. I think it is satisfactory.

STATUS OF ARPA

Senator JOHNSON. Would you please tell us for the record your experience with these new concepts of organization? First, how is the organization of the Advanced Research Projects Agency working out as it affects the Department of the Air Force? Is it satisfactory?

Mr. MACINTYRE. I think it is beginning to be. We had a natural hiatus, unfortunately, between the time it was stated there would be such an agency and the fulfilling of it with personnel. We are now very actively pursuing the programs we submitted and I fully expect that we'll get very good cooperation and can make sense out of them.

Senator JOHNSON. Now, then, the answer is that the organization as it is now functioning is satisfactory?

Mr. MACINTYRE. Yes, sir.

EXECUTIVE BOARD OF NACA AND NASA

Senator JOHNSON. Now for the second question. I notice the Air Force has 2 men on the 17-man executive committee of the NACA, General Putt and General White. What has been their experience? Has it been good?

Mr. MACINTYRE. Very good.

Senator JOHNSON. Do you know why the Executive Board of the NACA was changed to a purely Advisory Board in the NASA?

Mr. MACINTYRE. No, I don't know.

Senator JOHNSON. Do you have any recommendations on it?

Mr. MACINTYRE. I have no recommendations other than my previous comment with this supplement, perhaps. As I see it, and I don't know myself why it was changed, I surmised that the intention was to pull this in more to an executive direction rather than leave it in the control of a large Board. Beyond that, I have no comment.

ASSURANCE OF AIR FORCE REPRESENTATION

Senator JOHNSON. Do you think that the Air Force could rely on the Budget Director or other executive personnel to provide adequate Air Force representation on the NASA Board?

Mr. MACINTYRE. I think we can rely on the Secretary of Defense to take the position that the Air Force ought to have and will have representation here so far as he can assure that.

Senator JOHNSON. Do you think he can assure it?

Mr. MACINTYRE. Because we are naturally engaged in an activity, have the hardware, and under a military conception are going to be in this area in a very big way.

Senator JOHNSON. Does the Secretary of Defense have anything to do with this bill?

Mr. MACINTYRE. I don't know.

Senator JOHNSON. I thought you said that the Budget Bureau did.

Mr. MACINTYRE. You said did he have anything to do with it.

Senator JOHNSON. Did he have anything to do with drafting it?

Mr. MACINTYRE. I don't know.

Senator JOHNSON. Do you think you could rely on him to ask for representation for you?

Mr. MACINTYRE. Yes, sir.

Senator JOHNSON. Do you think there would be insurance that you would get it?

Mr. MACINTYRE. The only insurance lies in the human factor, plus the equal fact that the Air Force is so largely in this business and will be in it because of the military exception which grants that right under the bill.

DETERMINATION OF MILITARY REQUIREMENTS

Senator JOHNSON. If the Air Force determined that it had a requirement for a particular space vehicle, could it refuse to concur in transferring it to the Space Agency?

Mr. MACINTYRE. I think that the answer would be "yes," that we could.

Senator JOHNSON. What procedure do you follow in the Department to determine whether or not you have a military requirement for space vehicles?

Mr. MACINTYRE. What procedure?

Senator JOHNSON. Yes, sir, what procedure.

Mr. MACINTYRE. We would stake out our reasons for the existence of the requirement and state it to the Secretary of Defense.

Senator JOHNSON. Does the Air Force alone determine its own requirements, or does somebody else help them?

Mr. MACINTYRE. We determine what we think are our requirements, then we take that position with the Secretary of Defense.

Senator JOHNSON. Do you know whether, according to the wording of the bill as presently drawn, the power to concur or to deny concurrence applies to the three service Secretaries, as well as to the Secretary of Defense?

Mr. MACINTYRE. I don't think you can tell under the bill. I think probably the Secretary of Defense.

Senator JOHNSON. You don't think you can tell, but you think probably the Secretary of Defense. Do you think that is the kind of legislation you want Congress to pass, something that you can't tell, but probably?

Mr. MACINTYRE. Well, in view of our present situation in which in this area we are under the direction of ARPA, which is the Secretary of Defense, I think we are in that position now with concurrence depending on the Secretary of Defense.

Senator JOHNSON. In view of the fact that we really have four departments in the Defense Department, and in view of the fact that we are not sure what this bill says—don't you think that we ought to clarify the language and require the concurrence of each service secretary before the function is lifted away from them?

Mr. MACINTYRE. I'm not sure that you have to go that far.

Senator JOHNSON. Would you recommend that we do it?

Mr. MACINTYRE. I would be willing to rely on the Secretary of Defense in this job, because fundamentally, even today, unless we can sell him on a requirement, it is not met.

Senator JOHNSON. So you are willing to rely on the language now in the bill, although you are uncertain as to what it means?

Mr. MACINTYRE. Yes, because I think it is clear that the Secretary of Defense at least would be in a position to not concur, and we in turn in our relationships would have a satisfactory forum.

MILITARY IMPLICATIONS FOR SCIENTIFIC INFORMATION

Senator JOHNSON. Is it true that all scientific information on outer space has military implications?

Mr. MACINTYRE. Not necessarily all, as I understand it, from talking to scientists.

Senator JOHNSON. What hasn't?

Mr. MACINTYRE. Well, I listened, for example, to discussions about the moon and what is on the moon and what people are interested in learning, the scientists, and it is very difficult sometimes to say that some of the things they are interested in as a matter of pure science are necessarily of immediate military utility, or even a reasonably foreseeable one, Senator.

REQUEST FOR RECOMMENDATIONS

Senator JOHNSON. Mr. Secretary, I wouldn't want you to construe any of my questions to mean that I have a predetermined viewpoint on this legislation. But it does seem to me that the spokesmen of the Air Force on legislation as revolutionary as this and as important as this and as indefinite as this should have some specific recommendations as to how some of these uncertainties are to be clarified and tied down, and as to how certain protections are written into this legislation.

Now, my time is up. My colleagues have been very indulgent. All we want to do is to take the administration recommendations and the expert testimony that we can find in our Government, in Congress and the Executive, and private industry and every other place we can, and write legislation that will insure that we have acted adequately in this field. I want to urge you to consult with your associates in the Air Force, and if this is the Air Force position finally and you have no more suggestions than you have given to us this morning, we want to know that. If you have any others, we want to welcome them and solicit them and assure you that we'll give thorough and sympathetic consideration to them.

Senator Hickenlooper.

REPRESENTATION ON THE BOARD

Mr. MACINTYRE. May I make one comment, Mr. Chairman? I appreciate what you have said, and I would like, in effect, to re-comment this way. I think we feel strongly that the nucleus of an existing organization, which the NACA represents and which is partially in the space business now, and with whom we have worked well, is a very logical and sensible civilian organization with whom we can work, particularly in this gray area where it is almost impossible to distinguish between exactly what is military and what is purely nonmilitary.

Secondly, I have referred to the two basic provisions which I think largely concern us, namely, that it be perfectly clear that the military utility programs which are reasonably in that category are an exception to the jurisdiction of this agency, and they have to be worked out, therefore, jointly; and finally that I assume there will be adequate representation on this Board so that there can be sensible joint programs and good liaison.

Senator JOHNSON. On that point—I don't want to prolong it, but how can you assume anything when you are writing a bill? If you are going to assume anything, you don't have to say just "one from the Defense Department." I assume that you are assuming that the Air Force will continue to have two. At least, you hope that you will.

Mr. MACINTYRE. I wouldn't even care if it were 2, but I do think it should at least be 1.

Senator JOHNSON. One from the Air Force?

Mr. MACINTYRE. At least one.

Senator JOHNSON. Do you think the Navy ought to have any representation?

Mr. MACINTYRE. I would think it would make sense.

Senator JOHNSON. All right; do you think the Army ought to have representation?

Mr. MACINTYRE. I would think so.

Senator JOHNSON. Do you think the Department of Defense ought to?

Mr. MACINTYRE. That would be good, too.

Senator JOHNSON. Then why not say that the Department of Defense ought to have four?

Mr. MACINTYRE. I did say that it would be a good thing, sir.

Senator JOHNSON. Will you submit your suggestion for the record in that regard in the form of a suggested amendment?

Mr. MACINTYRE. Yes.

(See end of testimony.)

Senator JOHNSON. Senator Hickenlooper.

SAFEGUARDING MILITARY RESPONSIBILITIES

Senator HICKENLOOPER. Mr. Secretary, I am concerned in this legislation as to whether the tremendous and vital military necessities are adequately protected. That is not to disparage the idea of general civilian control of these matters.

Now, I think it is a matter of common knowledge that there are great pressures in this country in certain groups to minimize or even to almost eliminate military activities. I think it is a matter of common knowledge that in certain other fields where civilian control was quite prominent, that civilian control on occasions didn't move as fast as a lot of us, at least, thought it should move in providing for the military security of the country. Do you believe this bill adequately safeguards the military responsibilities?

Mr. MACINTYRE. Senator, I do in this sense, and for this reason: I pointed out the exception which leaves the military responsibility to the military, and my interpretation of it. Assuming that interpretation, I think it safeguards the jurisdiction.

Secondly, it fundamentally utilizes an organization that is now intact and with whom we have worked, and, as a matter of fact, where we now have one feature that you might call a space program, namely, the X–15, which will go 100 miles up, and where we'll get into the problems of weightlessness of the pilot for a few seconds, which is one of the problems of man in space. It is for those reasons that I think there is a safeguard here. One, the language of the law as I interpret

it, giving us the retention of responsibility in this area; and, second, as a practical matter in the gray areas, we'll be working with an organization intact with which we have worked for some years very satisfactorily.

Senator HICKENLOOPER. But it may not be sufficient under conditions that may arise in the future to rely upon the good offices of the various departments of Government. Sometimes it is very helpful to have a law a little more specific in these matters.

Mr. MACINTYRE. Well, that could be, but as I say, from my interpretation of the words we are left with the military responsibility which we need, and which we intend to fulfill in the space area.

Senator HICKENLOOPER. Do you think this legislation still leaves the authorization and directional authority with the Congress—that is, to prescribe what the military can or can't do, or will the legislation be giving over to this special agency the specification of those definitions?

Mr. MACINTYRE. I don't think you are turning over to the special agency the definition of military terms, Senator.

Senator HICKENLOOPER. Who will give that?

Mr. MACINTYRE. We might disagree with them on what is a military application in which event they will have to take it to the President to stop any program that we had initiated.

Senator HICKENLOOPER. I think that is all, Mr. Chairman.

Thank you, Secretary MacIntyre.

Senator JOHNSON. Thank you, Senator Hickenlooper.

Senator Anderson?

ADVISORY NATURE OF BOARD

Senator ANDERSON. I want to pick up a question, Mr. MacIntyre, that Senator Johnson started a minute ago. He asked you about this matter of not more than 8 members of the Board, and you said you interpreted that to mean that at least 1 from the Department of Defense is minimal. Then you got to these four members who might come from the Department of Defense. If you got up to 4 or 5 or 6 and there were 9 or more from private agencies with which the Department of Defense had relationships, buying and otherwise from them, would that give the Department of Defense a sort of dominance over the Board, do you think?

Mr. MACINTYRE. It might once again, Senator, under the present setup where the Board actually controls the policy, programs, and so forth of the Agency. But in this instance, this Board is purely advisory only to the Director, so that assuming such a situation as you have mentioned, the Director does not have to take their advice and might well not.

Senator ANDERSON. You don't believe, then, that the Director would feel any compulsion to take the direction of the Board? Then why have it?

Mr. MACINTYRE. I wouldn't put it that way, Senator. I say it is conceivable that he might not agree with that advice.

Senator ANDERSON. I think it is very conceivable.

Mr. MACINTYRE. And that he might therefore not act on it.

INSUFFICIENT TIME TO STUDY BILL

Senator ANDERSON. Don't you think it is strange that the agency most vitally concerned with this, the Air Force, had only 24 hours to look at the bill?

Mr. MACINTYRE. I can't say that I was very happy with having only 24 hours.

Senator ANDERSON. I'm sorry Senator Hickenlooper just left the room, because he is one of the authors of the Cole-Hickenlooper Act, which is a revision of the Atomic Energy Act, and the Atomic Energy Commission had 4 months to look at that bill and a long time previous to that. It struck me as very strange that 24 hours with a shotgun at your head was all you seemed to have.

Mr. MACINTYRE. I'm not a bit happy about that. I have tried my best to make my views known on it.

Senator ANDERSON. I imagine you are unhappy also because many times my questions seem to indicate that I am solely interested in atomic energy, but I am not. I am very interested in the Air Force, which has to deliver the hardware which the Atomic Energy Commission might develop. Thus far it is the only safe agency that the people in the Atomic Energy Commission have.

Mr. MACINTYRE. I might add, Senator, that though there was this very tight deadline, I pursued such views as we had beyond the deadline, even though I gave the views as instructed by the deadline.

Senator ANDERSON. You keep on pursuing them.

Senator JOHNSON. Do you have any explanation or justification for the deadline?

Mr. MACINTYRE. I never inquired, Senator, specifically, because I was at least permitted to continue the presentation of my views.

Senator JOHNSON. But you have heard no justification?

Mr. MACINTYRE. No, sir.

Senator JOHNSON. Thank you, Senator Anderson.

Senator ANDERSON. It seems to me that you are having the pressure of presenting it after the case is closed, however, and the bill comes up here, which they presented to Senators Johnson and Bridges to introduce.

EXPLORATION AND CONTROL OF SPACE

Do you regard a trip to the moon as military?

Mr. MACINTYRE. Going to the moon?

Senator ANDERSON. Yes, a manned vehicle to the moon.

Mr. MACINTYRE. I don't know if you would classify it as military or nonmilitary. You could have quite a debate about it. The essential fact, though, is that if we are going to do this promptly, you have to do it with hardware and facilities that are in the military. I don't think it proves much to debate whether it is military or nonmilitary. I certainly think we should do it, and we are certainly prepared to do everything we can that will enable us to.

Secretary ANDERSON. You say that whether the purpose is military or nonmilitary, the hardware is within the possession of the military?

Mr. MACINTYRE. That is correct.

Senator ANDERSON. How about Mars, which is 258 days going, if you are real lucky, and 258 days coming back if you are real lucky, and about 450 days lying there waiting for the planet to get into orbit

again so that you can get back. That is a pretty long tour of duty, maybe. Is that military or not military?

Mr. MACINTYRE. I would give the same kind of answer to that.

Senator ANDERSON. That the tools to do it are military?

Mr. MACINTYRE. Yes.

Senator ANDERSON. What does the military now have that looks forward to a Mars trip?

Mr. MACINTYRE. Largely development in the thrust of the engines and the vehicles that would go with them. I am sure that it is a natural extension of going to the moon.

Senator ANDERSON. A natural extension?

Mr. MACINTYRE. Extension, yes. I can see that the Air Force has the job of enabling itself to control space if it is desired that space should be controlled, or at least denied to others. I don't see how we can stop short at the moon and turn in our suits.

Senator ANDERSON. You said "denied to others," and when you went through your statement I marked that. How would you go about denying somebody else the right to discharge a missile moving 25,000 miles an hour, plus—what is the orbiting speed of the earth? Sixty-six thousand miles an hour?

Mr. MACINTYRE. How do you start out to deny that?

Senator ANDERSON. Yes.

Mr. MACINTYRE. When you ask me how, you get into a nice question of scientific probabilities, but that we should consider it, think about it, and be prepared to do it I accept as a fact.

Senator ANDERSON. We couldn't deny except by the complete occupancy of the side that is turned toward the earth. What would happen to that dark side that is turned the other way?

Mr. MACINTYRE. I couldn't tell you, Senator, how you might deny it. There are perhaps several ways and means and you get into the problem of evaluation of which is more feasible and how soon it is feasible.

Senator ANDERSON. On page 3 you refer to the fact that—

today satellites can enjoy uncontested access to the space above all nations.

Can a satellite shoot a weapon?

Mr. MACINTYRE. Yes, perhaps it can, or it could be made to. I'm not sure if it is any more satisfactory than an ICBM.

Senator ANDERSON. Well, an ICBM that you can discharge with a pretty good, firm base may miss its target as much as 10 or 20 miles. On the other hand the moon is moving thousands of miles, and one-thousandth of a second would throw it off as a launching site. Would it be a very likely place from which to discharge a weapon, and wouldn't our friends be as likely to receive the weapon as our enemies?

Mr. MACINTYRE. I can't answer your question, except to say that things that appear undesirable today can be reliable next year, or 10 years from now.

Senator ANDERSON. It is the difference between shooting a deer from the ground and shooting it from a moving car. People that shoot antelope find it more difficult if they are traveling 50 miles an hour. If you are traveling sixty-some thousand miles, if you take in the orbiting speed, you would have to be quite a marksman.

Mr. MACINTYRE. If the marksman carried a computer along with him, he might do better.

Senator ANDERSON. I would hope that nobody would be in the nose cone. It would be a kamikaze job, and I would hope we wouldn't use satellites for weapons.

Mr. MACINTYRE. Senator, there is a principle called the boost glide which in essence is putting up something that would have a man in it that would, in effect, orbit the earth and then glide and be used to put weapons on targets, so that we are now in the area of speculation that one can't just dismiss as being necessarily impossible.

Senator ANDERSON. On page 4, the very first sentence,

> We in the Military Establishment sincerely hope that all nations join together in whatever measures need to be taken to insure that space is never used for any but peaceful purposes.

If these weapons are solely for military purposes, does that further peaceful purposes?

Mr. MACINTYRE. It could. For example, a reconnaissance satellite might have a dual purpose. It might be a part of an inspection system to implement an agreement not to use space, and at the same time, it is a reconnaissance satellite that can be used to assist in targeting.

COOPERATION WITH NACA AND AEC

Senator ANDERSON. You speak of NACA being advisory and say that it has been in this field for many years. Since you have been in as Under Secretary, has it advised on any problem that you have before you, or has it been as a result of experiments directed by you or others?

Mr. MACINTYRE. Well, the X–15 is an example of a joint program in which the NACA is involved, and where the first flight will be the beginning of next year, we hope.

Senator ANDERSON. I understand they participate as operators. Do they participate as advisers?

Mr. MACINTYRE. Yes, sir.

Senator ANDERSON. What advice have they given you since you have been there?

Mr. MACINTYRE. I have cited this as an example.

Senator ANDERSON. But they didn't participate there as advisers; they were operators.

Mr. MACINTYRE. There is a fine line between advice and participation. Of course, in participation, they may advise with the configuration, for example, of the aircraft. It is a fine line. I'm not trying to quibble about it. They also, as you said, participated.

Senator ANDERSON. I'm mainly concerned with what this does to the Air Force——

Mr. MACINTYRE. I am, too, sir.

Senator ANDERSON.—because I don't find in here too much assurance of what the Air Force is going to do, just as I don't find too much assurance that the Atomic Energy Commission is going to go ahead. In the development of Project Rover, would you say the Air Force and the Atomic Energy Commission, have had very fine working relationships?

Mr. MACINTYRE. I think we have had very good working relationships, and it is a joint project that is in essence analogous to the X–15 as a joint project with the NACA.

Senator ANDERSON. I would think you have had very fine cooperation with them. The NACA is now picked up and made the whole show, and the Atomic Energy Commission is left out. Don't you feel some hesitancy in breaking up this partnership that has worked so well on Project Rover?

Mr. MACINTYRE. I don't think that is necessarily going to be broken up.

Senator ANDERSON. If NACA asks for it and the Atomic Energy Commission agrees, NACA can take both Pluto and Rover.

Mr. MACINTYRE. If the Atomic Energy Commission agrees.

Senator ANDERSON. What would you think the Atomic Energy Commission would do if the President asked for it?

Mr. MACINTYRE. I don't know, sir.

Senator ANDERSON. Well, you must have seen the testimony of the Chairman of the Atomic Energy Commission on this bill?

Mr. MACINTYRE. I'm sorry to say that I didn't read his testimony, Senator.

BROAD OVERLAP OF JURISDICTION

Senator ANDERSON. I'll just skip to page 2, and I think I'll be through. You mentioned people who cannot visualize the military applications of space technology. You speak of the "gray zone" that exists, later on in your statement you mention a "broad twilight zone of dual usefulness" and then, finally, this "gray zone of overlap." Doesn't it really boil down to the fact that the amount of definiteness is pretty small and the gray zone is almost the whole thing?

Mr. MACINTYRE. I wouldn't say it is the whole thing. To give you an example, I think the reconnaissance satellite as now conceived is pretty nearly a purely military project, Senator. When you talk about going to the moon, as I have mentioned, that is a gray zone.

Senator ANDERSON. But some of your military experts have said you want to be up there to watch what goes on in various parts of the earth and can dominate the earth from the moon. So it also is military.

Mr. MACINTYRE. Sure, but when you discuss that, you get different views of direct military usefulness.

PAY SCALES IN NEW AGENCY

Senator ANDERSON. Is Dr. York on the payroll of the Air Force?

Mr. MACINTYRE. No, sir; he is in the Office of the Secretary of Defense within ARPA.

Senator ANDERSON. Do you think there will be any problem on pay for scientists in the new agency?

Mr. MACINTYRE. I notice there is a provision in here which in effect permits them to be paid at a rate comparable to that which they would receive or could receive in industry.

Senator ANDERSON. Now, to use one case, because it is probably a pretty easy one, Dr. Bradbury at Los Alamos has many times turned down $50,000 a year. He can get far more than that any time that he wants to. Do you think there would be any objection if he ran the Agency and were paid $75,000 a year, when Congressmen, for instance, get less than that?

Mr. MACINTYRE. I don't think he would be paid that, because the standard is solely what he would be paid by industry.

Senator ANDERSON. I know what he would be paid, because I personally transmitted to him an offer of $50,000, and practically got my throat cut, because he is such a valuable person. I personally transmitted the offer to him, and he just laughed and walked away. Would we be able to do that with these scientists?

Mr. MACINTYRE. Well, sir——

Senator ANDERSON. Do you know what happened to Dr. Hafsted when he left his job at $12,000 a year with the Atomic Energy Commission? Do you know what General Motors pays him today?

Mr. MACINTYRE. No, but I know we are very lucky to have as many fine scientists working at the Government level and on Government pay scales as we do.

Senator ANDERSON. They work presently for the Government. Over here will be the Space Agency and over in that field they will get five times what the people here get. Do you think that will cause any trouble?

Mr. MACINTYRE. I don't think they'll get five times as much, but I think there will be a problem. The reason I say that is in essence in the military procurement contracts, we are indirectly hiring scientists at industry rates, and in some instances, or overall, the difference in average that they receive compared to comparable positions in the Government isn't five times. There is a disparity as to what the scientist would get working for industry. I am talking about an average, now, as distinct from particular people.

Senator ANDERSON. An average, yes, but I have kept track of the people who have left the Atomic Energy Commission, and even the Joint Committee on Atomic Energy. It is fabulous what they move into. I just wondered if one group of people got these fancy salaries and some other group that stayed with the Government and tried to perfect the X–15 got a third or less of the salary of these other people, would there be any difficulty?

Mr. MACINTYRE. That would create a real problem, there is no question about it.

Senator ANDERSON. Thank you, Mr. MacIntyre.

Senator JOHNSON. Senatory Symington—I'm going to have to leave for the floor in a minute. I asked Senator Anderson to preside when I leave. We'll conclude our hearing this morning with the Secretary after counsel has had an opportunity to examine him. Then we'll recess for lunch and reconvene at 2 o'clock, at which time we'll hear the Secretary of the Army and the Under Secretary of the Navy.

PREPARATION OF THE BILL

Senator SYMINGTON. Mr. MacIntyre, your presentation has impressed me as being clear, but I want to know a little more about this 24 hours on the bill. Who drew this bill?

Mr. MACINTYRE. I don't know any more than what I heard by indirection, as I testified previously.

Senator SYMINGTON. What was that?

Mr. MACINTYRE. I was given to understand that it was largely in the Bureau of the Budget.

Senator SYMINGTON. Who did it in the Bureau of the Budget?

Mr. MACINTYRE. I don't know.

Senator SYMINGTON. Will you find out and submit it for the record?

Mr. MACINTYRE. I'll try to find out.

Senator SYMINGTON. You don't think you can find out?

Mr. MACINTYRE. I think so.

Senator SYMINGTON. Will you submit it for the record?

Mr. MACINTYRE. I'll try to.

(See end of testimony.)

Senator SYMINGTON. Where did the bill go after it was sent to the Bureau of the Budget?

Mr. MACINTYRE. After it went back from the Defense Department?

Senator SYMINGTON. Was it sent to the Defense Department from the Bureau of the Budget?

Mr. MACINTYRE. I believe it came over from the Bureau of the Budget to the Defense Department, and then that was a draft that Defense sent to the Air Force for comment.

Senator SYMINGTON. Where did the 24 hours come in? Is that what the Department of Defense gave to the Air Force?

Mr. MACINTYRE. Yes, internally.

Senator SYMINGTON. How many hours did the Bureau of the Budget give to the Department of Defense to consider it?

Mr. MACINTYRE. I don't know that.

Senator SYMINGTON. Where does the staff work on it go on?

Mr. MACINTYRE. I think it is unfortunate that we had only 24 hours, Senator; but, in fairness, I'll say that I pursued my views beyond the internal deadline. I do not know how long it was before the Department of Defense comments went back to the Bureau of the Budget after my initial comments.

Senator SYMINGTON. Was it sent to the Secretary of Defense by the Bureau of the Budget?

Mr. MACINTYRE. I believe so, yes.

Senator SYMINGTON. Do you know how long the Department of Defense had it?

Mr. MACINTYRE. I don't know.

Senator SYMINGTON. Will you find that out and submit it for the record?

Mr. MACINTYRE. I'll try to.

Senator SYMINGTON. You'll try to? Is there any reason why you can't?

Mr. MACINTYRE. Not that I know of.

Senator SYMINGTON. There's no secret about it, is there?

Mr. MACINTYRE. Not that I know of.

Senator SYMINGTON. The testimony would seem to show that the time that is allowed the interested agency—the agency interested in this bill—to look it over and give comments on it is less, for example, than the time that is allowed if you plan to open or close or change an installation in a particular State. The administration has said, from the President down, that this is important legislation. So it is incredible to me that the Bureau of the Budget says, here it is, take it, and based on the testimony so far, it said let us know what you think of it in 24 hours. What was the rush in bringing it up here?

Mr. MACINTYRE. I don't know, Senator. I assume that the administration desired to have some kind of a program in this area.

Senator SYMINGTON. Now the bill has been criticized by the majority leader and by the ranking Republican and by senior members of this committee. That is not going to help it pass, do you think?

Mr. MACINTYRE. I don't know.

Senator SYMINGTON. What would be your thought about it?

Mr. MACINTYRE. I wouldn't think it would help.

Senator SYMINGTON. Don't you think it is important if you are going to try to get a bill passed to get as much information as you can about the bill, before it is presented for those people who are going to back it in the executive branch and in the committee and on the floor of the Senate. Wouldn't that be logical to you?

Mr. MACINTYRE. It sounds logical. It is beyond my competence.

Senator SYMINGTON. Why is it beyond your competence? You are in the executive branch of the Government, aren't you?

Mr. MACINTYRE. Yes; I am.

Senator SYMINGTON. You know how these things operate.

Mr. MACINTYRE. It didn't happen to be my particular responsibility.

Senator SYMINGTON. I know that. But you are testifying about it as your responsibility for the Air Force, are you not?

Mr. MACINTYRE. Yes, sir; and I hope I have testified that I would have been happier if we had had more time on it.

Senator SYMINGTON. You have, and I think your testimony is very good, but it would almost seem from the way it is handled that they didn't want it passed this way, wouldn't it?

Mr. MACINTYRE. I think they wanted it passed, but perhaps it could be handled in a different way.

Senator SYMINGTON. Maybe they wanted it passed in a different fashion than the way it was set up.

Mr. MACINTYRE. That I don't know.

Senator SYMINGTON. I just don't understand it. Was the White House staff involved in this legislation?

Mr. MACINTYRE. I don't know, Senator. I was spending my time trying to get my comments quickly and pursuing my views within the Defense Department.

Senator SYMINGTON. Actually, the White House would be involved in it because the Bureau of the Budget is really a part of the White House staff, is it not?

Mr. MACINTYRE. Yes, it is.

I thought you meant other than within the Bureau of the Budget, and I don't know.

Senator SYMINGTON. And you don't know how much time the Department of Defense had to look this legislation over?

Mr. MACINTYRE. No, I never asked.

Senator SYMINGTON. I think counsel can correct me, but Mr. Johnson said it was 24 hours.

Mr. WEISL. Yes.

Senator SYMINGTON. The Bureau of the Budget said to the Department of Defense and others in the executive branch: "Here it is, take it and like it."

Mr. MACINTYRE. I wouldn't say entirely, because the views were presented to them.

Senator SYMINGTON. At least you had 24 hours to look at it.

Mr. MACINTYRE. That is between the Defense and the Air Force.

Senator SYMINGTON. The testimony yesterday was that there were 24 hours between when the Bureau of the Budget sent it and the Department of Defense commented on it.

Mr. MACINTYRE. I don't know. It could be.

Senator SYMINGTON. Would that be 24 hours for the Department of Defense and 24 hours for the Air Force—48 hours all told?

Mr. MACINTYRE. It could be.

Senator SYMINGTON. Mr. Secretary, you have been performing a fine job for the Air Force. What did you do before?

Mr. MACINTYRE. I have been a lawyer all my adult life except for 4 years in the Air Force. In my law work I represented American Airlines, largely, as general counsel.

Senator SYMINGTON. You had some experience, therefore, with the relations between the Air Force and industry?

Mr. MACINTYRE. Yes, sir.

Senator SYMINGTON. What would you say of relationships like this between the Air Force and your company, as a lawyer, if they handled it this way?

Mr. MACINTYRE. I would expect that they would let it jell somewhat.

Senator SYMINGTON. Generally, the saying is, "Fine way to run a railroad." Would you say that this would be a fine way to run an airline?

Mr. MACINTYRE. I would say I would hope we would run it with a little more time given to such a decision as this.

Senator SYMINGTON. Would you care to give what you think would be Mr. C. R. Smith's observations if it were handled in this way?

Mr. MACINTYRE. I would rather he would speak for himself on that. You probably have as good an idea as I do.

Senator SYMINGTON. Thank you, Mr. Chairman.

The CHAIRMAN. Does counsel have any questions?

Mr. WEISL. Yes.

QUESTION OF NECESSITY OF CREATING A NEW AGENCY

Mr. Secretary, in your statement you point out that NACA today is a civilian agency?

Mr. MACINTYRE. Yes, sir.

Mr. WEISL. And that it is not only advisory, but also an operating agency?

Mr. MACINTYRE. Yes, sir.

Mr. WEISL. That it is adequately staffed, that it has laboratories and research facilities, and that it is already actually engaged in outer space or astronautic exploration?

Mr. MACINTYRE. Yes, Mr. Weisl, but I didn't say that it was adequately staffed in the sense of adequate to this job if it were given it in its full sense.

Mr. WEISL. All right. Why can't the duties of the NACA be enlarged and its budget increased so that it can perform the very duties that are required to be performed in this bill? Why do they need separate legislation creating a new agency?

Mr. MACINTYRE. Well, I haven't gone back and read all the statutes applicable to NACA but to some extent that has grown like Topsy. I referred to the fact that it still has the word "advisory" in its name.

Mr. WEISL. You say that is a misnomer in your statement.

Mr. MACINTYRE. I say it is now, but it is illustrative of the fact that it has grown somewhat like Topsy, and I think when you take on another area of the kind that is as broad as this is, it is helpful to clarify what its powers and duties are. As I read this, substantially it is to take what it is doing now and add this to it as a responsibility.

Mr. WEISL. It goes further than that. It takes away the vote of the members of NACA.

Mr. MACINTYRE. Yes; it does that, too.

Mr. WEISL. And give them only a consulting or advisory power.

Mr. MACINTYRE. Yes.

Mr. WEISL. And puts the power in the hands of a Director. Do you think that is an improvement?

Mr. MACINTYRE. I think that gets into the fact that some agencies of government are set up one way. Others have a single head. There are other agencies of this kind. I assume it is intended, therefore, to bring this more under the direct executive line to the President through the selection of a single individual who really runs it.

Mr. WEISL. But this single individual under the statute is to be recommended to the President by the 17-man Board.

Mr. MACINTYRE. That is correct.

Mr. WEISL. Well, isn't the Director, Mr. Dryden, of the NACA doing a good job?

Mr. MACINTYRE. I think he is doing a fine job.

Mr. WEISL. Has he any difficulty in getting the votes of the 17 members of the Board of NACA?

Mr. MACINTYRE. I don't know. I don't believe so.

Mr. WEISL. Is his work satisfactory to your knowledge?

Mr. MACINTYRE. Yes. I think it has been on the whole, yes.

Mr. WEISL. Well, the question I put to you is why do we need this legislation if all that we are doing is enlarging the power and the duties of the NACA?

Mr. MACINTYRE. Well, in the first place, there is a name change of an organization involved and then there is clarification of some of its duties, and, in addition, as you point out, there is one very real change in the internal machinery of the Agency.

Mr. WEISL. But I ask you whether that is in your opinion a good or a bad change. If by voting, satisfactory results have been obtained, is it wise to take——

Mr. MACINTYRE. I think it could conceivably be a good one because, as we move into this area, if you want to get 17 people to agree, assuming they had to make the operative policy decision, it may be simpler if they are advisers and 1 man who is under the President has to make the decision.

Mr. WEISL. But they have agreed and they have made decisions for 43 years in NACA, and while it is true that to some extent their activities may be of a wider scope, the principle of their activities would be the same.

Mr. MACINTYRE. No. But the principle is also that of a committee.

Mr. WEISL. Sir?

Mr. MACINTYRE. The principle is also that of a committee having to come to a decision, 17 people. I think we will welcome in the Air Force prompt decisions on some of these space programs.

Mr. WEISL. Well, haven't you had prompt decisions from the NACA?

Mr. MACINTYRE. Yes; but they are not in some of the space programs as such.

Mr. WEISL. I thought in your statement you said they already were in the space program.

Mr. MACINTYRE. I said to some extent, yes, and I cited the X–15 as one.

IMPORTANCE OF CLEAR LANGUAGE IN THE LAW

Mr. WEISL. Now, I am sure you recognize the importance of language in the statute.

Mr. MACINTYRE. Yes, sir.

Mr. WEISL. And you found that great detail was used in the Atomic Energy Commission statute. Great care and precision was used in defining terms, in delegating duties, in governing international activities, in fact, every phase of work the Atomic Energy does was clearly defined in the statute. I can't understand why we shouldn't have clear definitions insofar as it is possible to have them in this statute. After all, this is not a Government of people. It is a statute of law.

Mr. MACINTYRE. I think part of the difficulty lies in your own words "insofar as possible." "Possible" here involves a time element. And an example might be the question of what is a military program in space and what is a nonmilitary.

Mr. WEISL. Well, shouldn't someone have the power to decide that?

Mr. MACINTYRE. I am not sure that there is any one person I can think of who can really decide that because it is such a terribly difficult area at this stage. The gray areas may later develop into clear bands of white and black, but we are confronted here with the necessity of moving ahead within some kind of structure, and I would hate to hold things up to merely debate what the words meant and try and be too precise in that area.

Mr. WEISL. You aren't being held up now. The Air Force and the Army and the Navy and the ARPA are all currently engaged in research in outer space.

Mr. MACINTYRE. The problem is that of integrated programs in some areas and to some extent that may——

Mr. WEISL. Do you think——

Mr. MACINTYRE.—that may depend on a civilian agency being in existence that we know we can deal with and move ahead with.

Mr. WEISL. Well, do you think you will save time when disputes will arise as to what is and what is not related to military operations? Do you think you will save time when you will have the struggle for budgets between the research division of the military and the research division of this new Agency?

Mr. MACINTYRE. No. I think you always have that problem, but I don't want to lose more time with a prolonged debate on what the Agency should be——

Mr. WEISL. Well——

Mr. MACINTYRE.—in addition to these other problems.

Mr. WEISL. Well, do you think Atomic Energy was an important matter?

Mr. MACINTYRE. Certainly.

Mr. WEISL. Do you think that the Congress wasted time in deliberating carefully before they enacted that statute so that the powers and the duties of that Department would be defined as clearly as possible?

Mr. MACINTYRE. No. That goes way back but it is not very many months ago when one of the questions was what are we doing with urgency here, and I agree that there was a necessity here to move ahead.

Mr. WEISL. Wasn't there necessity to move ahead in the atomic field? Without the atomic bomb and without the atomic warhead you wouldn't have any military defense today, would you?

Mr. MACINTYRE. That is correct, but you were then dealing with the situation where the other fellow didn't possess it, and here we know they possess the capability and we must move even faster.

Mr. WEISL. Well, as far as we knew then, he didn't possess the atomic bomb, but we knew that he was working on it.

Mr. MACINTYRE. We had an idea that he was behind us. Here we know they have the capability.

Mr. WEISL. Well, to illustrate the difficulty that comes with improper wording, you have today a tremendous battle right within the the Defense Department over the construction of words that are far clearer than these. For instance, in that National Security Act a provision enacted there is that each department shall be "separately administered," but under the direction and control of the Secretary of Defense. And yet there has been a dispute as to the meaning of those words which has led—according to the testimony given before the House committee—to interservice rivalry and lack of cooperation between the Secretary and the various departments. Isn't that true?

Mr. MACINTYRE. That is right. But I am concerned at this moment——

Mr. WEISL. I don't want to belabor the point.

Mr. MACINTYRE. —with this area of space programs which I think has a tremendous urgency, where it is very difficult to differentiate between civilian and military and where it is essential we move ahead promptly with some kind of a civilian agency with whom we can cooperate.

Mr. WEISL. I don't want to belabor the point and I know there is a sense of urgency, but I don't think you satisfy that sense of urgency by creating a difference of opinion by language which divides the authority between the military and the civilian branches with no criteria, with no standard as to what is military or what is civilian. I know that it is difficult, but there should be some standard or some method of promptly deciding it because——

Mr. MACINTYRE. I am not sure——

Mr. WEISL. —because what you say, for instance, is a little different from what Dr. York said. Dr. York thought probing of planets and lunar progress was purely civilian. What you say is that it is also a military problem, because while missiles are the method of defense today, tomorrow we might have to shoot down space platforms on the moon or on the planets or in outer space.

Mr. MACINTYRE. I don't think I quite said that. I said the hardware and the capability at this stage spins out of what the military possesses. I also said as far as the doing of it is concerned,

that it is to my mind a gray area as to whether you call it a military project or civilian, and there can be quite a semantics debate about that.

Mr. WEISL. Thank you, Mr. Secretary.

My time is up, Mr. Chairman.

Senator ANDERSON. Thank you, Mr. Secretary.

The committee will now recess until 2 p. m. when it will hear from Army Secretary Wilber M. Brucker and Assistant Secretary of the Navy Garrison Norton.

(Whereupon, at 11:55 o'clock a. m. the committee recessed to reconvene at 2 p. m., the same day.)

(The material for the record, supplied by Mr. MacIntyre, is as follows:)

DEPARTMENT OF THE AIR FORCE,
OFFICE OF THE SECRETARY,
Washington, May 12, 1958.

Hon. LYNDON B. JOHNSON,
Chairman, Special Committee on Space and Astronautics,
United States Senate.

DEAR MR. CHAIRMAN: During the hearing of S. 3609 on May 8, 1958, you requested that I submit to the committee a specific recommendation with respect to the number and distribution of members from the Department of Defense who would be on the National Aeronautics Board. The Air Force recommends that the bill be amended in this regard as follows:

On page 3, section 4 (2) (I) delete the phrase in line 23 "who shall be from the Department of Defense" and substitute in lieu thereof "including at least four from the Department of Defense, of which not less than one each shall be from the Department of the Army, Department of the Navy and Department of the Air Force, respectively."

Sincerely yours,

MALCOLM A. MACINTYRE, *Under Secretary*

DEPARTMENT OF THE AIR FORCE,
OFFICE OF THE SECRETARY,
Washington, May 19, 1958.

Hon. LYNDON B. JOHNSON,
Chairman, Special Committee on Space and Astronautics,
United States Senate.

DEAR MR. CHAIRMAN: During the hearing on S. 3609 on May 8, 1958, you requested that I furnish information to the committee concerning the individual in the Bureau of the Budget who drafted the legislation, the amount of time which the Bureau of the Budget gave the Department of Defense to consider the legislation, and the time which the Department of Defense had the legislation.

Concerning the drafting of the legislation, it is my understanding that Mr. Maurice H. Stans, Director of the Bureau of the Budget, during his testimony before your committee on May 13, 1958, discussed the drafting aspects of this legislation.

With respect to the amount of time which the Bureau of the Budget gave the Department of Defense to consider the legislation and the time which the Department of Defense had the legislation, I wish to note that the Department of Defense received a request from the Bureau of the Budget for comments on a draft bill on Thursday afternoon, March 27, 1958. The Bureau of the Budget requested Department of Defense comments no later than noon Monday, March 31, 1958. The Department of Defense comments on the draft bill were sent to the Bureau of the Budget on Tuesday, April 1, 1958.

Sincerely yours,

MALCOLM A. MACINTYRE, *Acting Secretary.*

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AFTERNOON SESSION

Senator JOHNSON. The meeting will come to order.

We are pleased to have with us this afternoon the Secretary of the Army, the Honorable Wilber M. Brucker.

Mr. Brucker, I don't believe you need any introduction to the members of this committee.

I ask unanimous consent of the committee to insert at this point in the record a brief biographical sketch of the Secretary. Without objection, that will be done.

(The biographical sketch referred to is as follows:)

BIOGRAPHY OF WILBER M. BRUCKER, SECRETARY OF THE ARMY

Mr. Brucker was born in Saginaw, Mich., on June 23, 1894. He received his doctor of laws degree from the University of Michigan in 1916. He has since received several honorary degrees.

Mr. Brucker served with the 33d Infantry of the Michigan National Guard, 1916–17, and with the 166th Infantry 42d Division in 1918–19. He was assistant prosecuting attorney for Saginaw County, Mich., 1919–23; prosecuting attorney, 1923–27; and assistant attorney general of Michigan until he became attorney general in 1928. He served as Governor of Michigan 1930–33. He was in private practice until 1954 when he became General Counsel for the Department of Defense. He has served as Secretary of the Army since 1955.

Mr. Brucker is a member of the Michigan State, Federal, and American Bar Associations; the American Legion, and the Veterans of Foreign Wars. He is a past president of the Rainbow Division Veterans.

Senator JOHNSON. Mr. Secretary, if you have a prepared statement, we will be pleased to have you give it to us. Just proceed in your own manner.

Secretary BRUCKER. Thank you very much. I have.

STATEMENT OF WILBER M. BRUCKER, SECRETARY OF THE ARMY, ACCOMPANIED BY MAJ. GEN. JOHN H. MICHAELIS, OFFICE OF LEGISLATIVE LIAISON; MAJ. GEN. JOHN DALEY; AND DR. WILLIAM H. MARTIN

Secretary BRUCKER. Chairman Johnson, Senator Saltonstall, and other members of the committee, in preparation for my appearance here, I have reviewed in my own mind the vitally important tasks which face this committee. The age of space, which suddenly became a reality with the orbiting of the Russian sputniks, added a new dimension of peril and of promise to our national interest. Scientific and technological progress leading to the development of space objects both for military and civilian purposes is comparable with the progress of development in the field of atomic energy. The immensity of the task involved in forging ahead and maintaining indefinitely a commanding lead will require the combined efforts of our entire Nation. The issue is of such consequence and scope that to attempt anything less than a completely coordinated, united, dynamic national program to attain our objective would be unrealistic.

In addressing yourselves to the task of enacting effective legislation to cope with the problems relating to the exploration and eventual conquest of outer space, you are wisely conducting a thorough study and investigation of all aspects of astronautics. This is a herculean undertaking, the results of which will affect this Nation for generations to come.

It is the Army's desire to do everything in its power to assist in the work of this committee, and it is in that context that I would like to outline the Army's interest in space, review very briefly our contribution to present and future space programs, and lay before you a few observations regarding the National Aeronautics and Space Agency proposed in S. 3609 under discussion.

The Army has been interested in space for many years because of the military aspects involved. Immediate applications which have particular significance for the Army include reconnaissance, both visual and electronic; communications missions of many kinds; meteorological observations which might lead to better weather predictions; mapping and geodesy, for which the Army has a primary responsibility; and finally, the employment of such satellites and space vehicles as space laboratories for continuing basic and development research benefiting all potential and actual users of space.

While these applications are of special concern to the Army, we do not consider that they are by any means exclusively or uniquely so. They are of concern to all the military services. They are national military requirements, and each of the services has material assets and resources of know-how to contribute toward the attainment of the objectives sought. These objectives, by and large, have equal significance in connection with the civilian, or commercial, utilization of space. Civilian agencies also have essential resources which can con-

tribute to the common effort. The Army strongly advocates a program which takes into full consideration every military and civilian interest in space, and employs every resource available to reach our goals.

In this connection, I feel that it is hardly necessary to point out that the most important interest, the one which must be given first consideration in all deliberations, is the security of the Nation. In line with this, the civilian and military interests in this field should be joined in a common effort. To this end the activities by civilian and military agencies should be cooperative and complementary. The civilian and military have so much in common in exploring and developing the space field that both must bend every effort to reach common objectives. Neither can afford to withhold complete cooperation in order to present a united front in the conquest of space.

The Army's long interest and experience in the field of space science has resulted in a demonstrated capability to contribute materially to a national space program. In 1944, the Army fired our country's first modern military ballistic test vehicle, and the following year the first high-altitude sounding rockets. In 1947, the first American surface-to-surface guided missile, Corporal E, was fired by the Army. In 1949, an Army missile established the record-breaking speed of 5,150 miles per hour, and reached an altitude of more than 250 miles. This was an epochal flight marked by several other significant "firsts." For the first time in our history, communication was achieved by radio with an object more than 250 miles above the earth; for the first time a two-stage rocket was separated in flight; for the first time rocket motors were ignited at high altitudes, and the thermal barrier was first observed.

The Army Ballistic Missile Agency at Redstone Arsenal and thousands of dedicated Army scientists and engineers have been engaged for years in developing missiles, rockets, and other modern weapons tailored to the Army's exacting requirements. They comprise one of the best reservoirs of creative talent which exists in the world today for the ultimate conquest of space.

An outstanding example of the achievement of the Army's missile team is the great 1,500-mile intermediate range ballistic missile Jupiter, which is now in production, and will soon take its place in the line of America's defense. An Army Jupiter-C missile—so called because similar vehicles were used to test components of the Jupiter during the course of its development—lifted the United States into the space age when it hurled the first American satellite, Explorer I, into orbit on January 31 of this year, and subsequently put Explorer III into orbit. Earlier the Jupiter-C had demonstrated the successful solution of the difficult problems involved in bringing a missile nose cone intact through the thermal barrier after a ballistic flight in space above the earth's atmosphere. All of these accomplishments have contributed significantly toward the ultimate conquest of space.

The data obtained by means of two Army satellites, particularly in the field of cosmic rays and high-energy radiation in the outer fringes of the earth's atmosphere, has already had and is continuing to have a profound effect on our knowledge of the environment we must penetrate and in which we must learn to operate.

Now the Army Ballistic Missile Agency has been directed by the Advanced Research Projects Agency of the Department of Defense

to launch at least 2, and possibly 3, additional earth satellites. The Army is well equipped to make many further contributions to a national long-range program for the conquest of space. It would seem logical for teams of scientists such as those at the Army Ballistic Missile Agency, and the Jet Propulsion Laboratory at the California Institute of Technology—teams who have already proved themselves in achievement—to be used in the program of the proposed National Aeronautics and Space Agency through ARPA, the existing Department of Defense agency in this field.

Turning to the bill under consideration, I believe that we could all live with it if its legislative history allows us to construe it properly. It has been suggested that it should be drastically revised. In my opinion, however, it is basically sound, and the alternate course of clarification in some areas would be the proper one to take.

I concur in the concept that the National Aeronautics and Space Agency should be a civilian agency with Department of Defense representation. Such military representation is particularly important to the overall success of NASA since within the Department of Defense programs are to be found most of the talent, and most of the physical assets which are necessary to the immediate programs which would be carried on by the NASA. The NASA, therefore, will have major dependence upon the Department of Defense for a long time to come.

As set up under S. 3609, the advisory National Aeronautics and Space Board would consist of not to exceed 17 members, at least 1 to represent the military interest, and the rest concerned with the civilian interest. It seems clear to me that whatever the composition of the Advisory Board may be, fully adequate military liaison will be established and maintained with the working group of the Agency to the end that military requirements are given adequate consideration.

I believe the Department of Defense should be assured the same working relationship with the proposed NASA with the National Advisory Committee on Aeronautics. I see no major problems in establishing effective cooperation between the National Aeronautics and Space Agency and the Department of Defense, particularly since Department of Defense responsibility is now centered in the Advanced Research Projects Agency. However, it is possible that the bill now under consideration could be interpreted so as to restrict unduly the activities of the Department of Defense in the astronautics and space field. It is frequently difficult to determine as we embark on so vast and unknown an enterprise as space exploration just what facets of this exploration will have application to weapons systems and military operation. I do not believe it to be the intent of the administration or of the Congress to prohibit research in this area by the agencies of the Department of Defense.

The legislative line should not be drawn too sharply between what the Department of Defense and its agencies can do and what they cannot do in the field of space development. This is a matter which ought, in my opinion, to be dealt with administratively between the Department of Defense and the NASA. It should also be clearly emphasized that the NASA, like the Atomic Energy Commission, is a part of the executive branch. It is imperative that the character of the National Advisory Committee for Aeronautics, an executive agency of which the NASA will be the successor, should be preserved. If the United States is to cope with the fast-changing conditions, and

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kaleidoscopic developments in the field of space, full discretion in the planning and operations of such an important agency should be left to the President.

The recent attainment of stable orbited satellites by man in the space close to our planet has had a profound impact upon the urgency to develop a forceful and energetic program in the conquest of space. The need to forge ahead in this new environment is manifest not only in military applications but more importantly in those areas which benefit man and the world community. The required legislation must facilitate the growth of the total coordinated effort to meet the needs of peaceful developments without placing in jeopardy the enhancement of military capabilities.

In a direct sense, space development and exploration is linked to a broader national problem. The strength and depth of the Soviet technological challenge is part of a larger scheme of world domination by the Communists. To add emphasis to the world threat recent Soviet moves are contemporaneous with the birth of the missile-nuclear-space age in which they have already demonstrated technological skill and psychological dexterity.

Accordingly, our American response must be productive in supplying the means by which we can apply our genius and resourcefulness to the task of conquering space effectively and with dispatch. Our space program must be broad in scope, and must utilize every capability in order to make the best possible use of our combined national potential in this new field.

I have reviewed the proposed legislation and recommend its adoption.

SOURCE OF SUGGESTIONS FOR REVISIONS

Senator JOHNSON. Thank you very much, Mr. Secretary.

I want you to turn to page 4 of your statement, the last paragraph. Turning to the bill under consideration—and that is the problem we have here, so that is a part of your statement that interests me—you say, and I quote,

> I believe that we could all live with it if its legislative history allows us to construe it properly. It has been suggested that it should be drastically revised.

Who made that suggestion?

Secretary BRUCKER. I have seen the newspaper reports to that effect.

Senator JOHNSON. You don't have any——

Secretary BRUCKER. No. I was just speaking generally.

Senator JOHNSON. A newspaper suggested that it be drastically revised, but none of your people suggested it?

Secretary BRUCKER. No.

Senator JOHNSON. I thought maybe some of your people in your Department made that comment.

Secretary BRUCKER. No, Mr. Chairman.

24 HOURS TO CONSIDER THE BILL

Senator JOHNSON. How long were you given to make these comments on this bill?

Secretary BRUCKER. Well, it was about 24 hours. I think precisely 24 hours.

Senator JOHNSON. So you were another one of those officials who were asked to comment on this bill as it whizzed through the Department in 24 hours.

Secretary BRUCKER. That is correct. I was asked to comment in that period for the Army.

Senator JOHNSON. How long was General Medaris given to make his comments and suggestions?

Secretary BRUCKER. I am not acquainted with the time that he had nor when it was; but he was not present during that 24 hours. He was at the Huntsville Arsenal.

Senator JOHNSON. Did he submit any comments to your knowledge?

Secretary BRUCKER. Not to my knowledge.

Senator JOHNSON. Would he have submitted any without your knowledge?

Secretary BRUCKER. I think not.

Senator JOHNSON. The answer is he did not submit any comments?

Secretary BRUCKER. None that I know of, sir.

Senator JOHNSON. You say:

> We could all live with it if its legislative history allows us to construe it properly.

Is that a polite invitation to us to rewrite it, to revise it?

Secretary BRUCKER. No. What I mean precisely, or a little better on that was this: The clause that I have reference to, or the clauses, have to do with the section 2 of the bill that states the amount of authority that should be granted to the Director or to the Space Agency and then makes reference to the Department of Defense, and it is in that context that I made this comment that I think that is the crux of that part, and that an interpretation of that would be most important and helpful.

Senator JOHNSON. I quite agree with you. But I think what amazes me is that you say "papa knows best." Let us leave it all up to the Executive and let time adjust things. It seems to me that on a subject as important as this is, it shouldn't be left up to interpretation. We should write some definite language in the bill that will set the pattern to be followed. And that seems to be what officials are suggesting in a polite but not very definite way.

Secretary BRUCKER. May I make reference——

Senator JOHNSON. Maybe it is because of that 24-hour limitation or maybe it is just party line, but what I am trying to find out is whether you people that are going to live with this thing and are going to have such great and far-reaching responsibilities under it, really embrace and recommend this bill and whether you think it is the best product that ingenious minds in the Defense Department can produce.

Now, our information is that you got a bill from the Budget Bureau. You were asked for comments within 24-hours. You submitted them and we got the same bill up here without any substantial corrections. Is that your information?

Secretary BRUCKER. I don't have all of that direct, but I do have the information direct that it went to the General Counsel of our Department and then back, within 24 hours, to the General Counsel of the Department of Defense. And I assume from what I have heard, but I don't know it, of course, that it went back from him directly within the short period to the Bureau of the Budget.

Senator JOHNSON. Well, now, you don't think it would be wise for Congress to shoot this bill through the Congress as fast as you got it through the Department, do you?

Secretary BRUCKER. No. I don't ask any 24 hours on the bill.

Senator JOHNSON. Now on your comments, have you seen any of them reflected in a rewrite of the bill that came to you?

Secretary BRUCKER. As to any comments, they were technical comments that were made—I think by the Judge Advocate General, as I recall—and I think there were some of those that were adopted. I didn't compare it, but I am quite sure that some were adopted. They were technical matters entirely.

Senator JOHNSON. Well, the Department of the Army under your direction has accepted the bill prepared by the Bureau of the Budget with only a few technical corrections.

Secretary BRUCKER. We reported favorably on it and sent it back that way.

Senator JOHNSON. With only a few technical corrections.

Secretary BRUCKER. That is right.

Senator JOHNSON. And you made no other suggestions.

Secretary BRUCKER. No other suggestions were made at that time.

Senator JOHNSON. Have you made any since?

Secretary BRUCKER. I have in discussion, and have discussed the matter.

Senator JOHNSON. To what effect?

Secretary BRUCKER. But no recommendations with respect to any changes. I have discussed it, of course, with those who are in authority in the Department of Defense. That I have done—with Secretary Quarles.

Senator JOHNSON. What additional suggestions have you made?

Secretary BRUCKER. Nothing except that my attention has been focused rather directly on the language in section 2 of the bill, lines 4 to 10 inclusive, which has to do with the Director of the Space Agency and the relationship with the Department of Defense. I have been endeavoring to resolve in my mind the interpretation of that without legislative counsel or statement on it. That has been the matter that has intrigued me.

Senator JOHNSON. Could that be made clearer in your opinion?

Secretary BRUCKER. I think it might be made clearer but if it is properly interpreted, I think we could live with it perfectly all right.

REQUEST FOR CLARIFYING LANGUAGE

Senator JOHNSON. It is probably too important a matter to guess on some interpretation. If you think the language of the bill could be made clearer, would you give us the benefit of any written suggestions you think would clarify it as far as the Army is concerned?

Secretary BRUCKER. I would be glad to do that.

May I state to you what I have in the back of my mind here on it, because I think any help I can give you, I ought to do it.

As it is written here, there isn't any doubt about the fact that there is somebody who could question just where the relationship between the Department of Defense and the Space Agency Director—what that relationship would be. There might be those who might argue that the Department of Defense is wholly independent of the Space Agency

and that it doesn't owe allegiance, liaison, or otherwise, to it on those things which are primarily military in nature.

On the other hand, if I were given the bill, which I am, to give you a very plain answer on, I would say that with the history that I have so far, that it is little clearer than that, and that it might not be necessary to question that; because I believe that the intent of the whole act is to give to the new Space Agency a rather transcending position in the field. It is my belief that what is intended or was intended was to give to the Space Agency a surveillance that would be overall; and that, while the Department of Defense and its military objectives were recognized. they were not expected to be primary, as against the surveillance of the Space Agency.

I think that that is something that I should call to your attention.

Senator JOHNSON. How do you think the bill should be written?

Secretary BRUCKER. I think it should be written so it is clear, if there is any doubt that it is that way.

I think it should be a civilian agency with civilian direction and civilian surveillance that should not be exclusive of military interests. The Agency should take into consideration the military interests but should have an overall surveillance, taking into consideration all of the objectives of space and not being able to cut off Defense, but to take into consideration those things which are bona fide, legitimate, defense vehicles or agencies or projects. If there is any dispute about the matter, then that can be resolved just the way interdepartmental matters are now.

Senator JOHNSON. Well, now, with that thought in mind, would you try to suggest language to us that will clarify that particular point as you think it should be, and submit it in writing so that we may consider it in our executive session to mark up the bill.

Secretary BRUCKER. I would be happy to.

Senator JOHNSON. It is your responsibility to defend the country. Would this bill as written—I am not talking about how it may be interpreted—would this bill as written interfere with you in carrying out that responsibility in any manner?

Secretary BRUCKER. I don't think it will interfere with it.

I might raise a question as to where that interpretation would leave it, but I don't think it would interfere with it. I think we would go right ahead full steam with what we are doing.

Senator JOHNSON. Have you talked to General Medaris about this bill and the conflicting interpretations that might be placed on it?

Secretary BRUCKER. I talked to him briefly at the time of his testimony before the House committee, and General Medaris has already testified there, and I refer you to that testimony. And that was the sole time that I talked with him in my office.

Senator JOHNSON. I wonder if you would be willing to do this: To consult with him further before you make any recommendations and then submit them to us in writing. We ask you this not for the purpose of having a conflict between the Army, the Navy, or the Air Force, and the executive or the judiciary or anybody else, but in order that we can get the best product of the best minds that we have. We are trying to give this country the type of development that it has the right to expect from our system.

Secretary BRUCKER. I will be happy to do that, Mr. Chairman.

(The material appears at the end of Mr. Brucker's testimony.)

DRAFTING OF THE BILL

Senator JOHNSON. You know in times past the executive branch has relied very heavily on studies by commissions in connection with reorganization problems and problems involving Government organizations.

Do you know whether any experts such as the Hoover Commission were consulted in connection with this Agency?

Secretary BRICKER. I do not.

Senator JOHNSON. What is the name of the person that wrote the bill?

Secretary BRUCKER. I don't know.

Senator JOHNSON. You don't even know who wrote the bill?

Secretary BRUCKER. No; I do not know it.

Senator JOHNSON. Do you know where it was written?

Secretary BRUCKER. No; I do not.

Senator JOHNSON. Have you ever heard where it came from?

Secretary BRUCKER. I have heard rumors.

Senator JOHNSON. What were the rumors?

Secretary BRUCKER. I have heard rumors that Dr. Killian was very much interested in this, but that is merely a rumor. I did not confirm it in any way.

Senator JOHNSON. Well, I have heard rumors that he is very much interested in this whole field. But did you hear rumors that he had anything to do with drafting the bill?

Secretary BRUCKER. No; I did not, Mr. Chairman.

Senator JOHNSON. But you have heard he is interested in this general subject.

Secretary BRUCKER. Yes; not only interested in it, but is following it very closely.

Senator JOHNSON. Do you know whether he has approved the bill as written?

Secretary BRUCKER. I do not. I have had no discussions with Dr. Killian about it.

DIVIDING PROJECTS INTO MILITARY AND CIVILIAN

Senator JOHNSON. In your opinion, can the work on satellites that you are now doing in Huntsville, Ala., be divided between civilian and military aspects?

Secretary BRUCKER. Well, that is something I would like to confer with General Medaris on, project by project.

I am certainly sure that it can go along with a space agency in which civilian leadership is primary.

Senator JOHNSON. Do you think the right way to go about this space problem is to divide it between civilian or military, or do you think there are some areas where it can't be divided, such as hardware and scientific personnel?

Secretary BRUCKER. I think there are areas, Mr. Chairman, where it cannot be divided—where there has got to be an allocation or a placement of the project with the military. And vice versa.

I think there are some projects that the military have been doing that can very properly be placed as a project with the NASA.

Senator JOHNSON. In your experience, does it make any difference to a scientist whether he is working on a scientific experiment within the Department of Defense or outside?

Secretary BRUCKER. Your question is: Is there a difference between them?

Senator JOHNSON. Do you think it makes any difference to him whether he is working within the Department of Defense or outside the Department of Defense, just so long as it is a scientific experiment?

Does the organization have anything to do with it, in other words, so far as he is concerned?

Secretary BRUCKER. Well, ordinarily, no. But in this may I add "yes."

I think the scientists that work with the organization at Huntsville and in the Jet Propulsion Laboratory, as an illustration, work much better as a team than they do alone.

It has been my experience with them that that team concept improves each man and makes him more powerful than if he were alone.

In other words, their contribution to the whole is very much better under General Medaris or—let us put General Medaris out of the picture—there together. I am very sure that General Medaris adds to that.

Senator JOHNSON. In your opinion, should the Department of Defense, through ARPA, be permitted to continue advanced research which cannot be labeled precisely at the present time as military or civilian?

Secretary BRUCKER. I would think that ARPA very properly has enough to engage its interest in those things which are military.

Senator JOHNSON. And should not be allowed to handle anything that can properly be interpreted as civilian.

Secretary BRUCKER. May I just say this about that:

I don't know what projects they have. I am not well enough acquainted.

I would think basically that that is the way to look at it. But I wouldn't want to say that the projects they have don't have some military interest or something which may so eventuate.

I have heard it said that it may start off to look very much like a civilian project but that later on there is a breaking of a barrier and they find it has a very, very good military interest.

Senator JOHNSON. Senator Saltonstall?

Senator SALTONSTALL. Thank you, Mr. Chairman.

CIVILIAN COOPERATION

Mr. Brucker, the chairman has gone into the question of civilian administrative cooperation, as has also your statement, so I will not go into that except to say that I understand that you believe that the military and the civilians can cooperate and should cooperate; and that precedence will not be given to the civilian or to the military, but that they will go along together cooperatively.

Is that a fair interpretation?

Secretary BRUCKER. Yes, that is a fair interpretation of my impression.

Senator SALTONSTALL. All right.

OBJECTIVES IN DEVELOPING SPACE PROGRAMS

Now, may I ask you what is your understanding or your conception, rather, of the objectives of the conquest of space and the research and development of space?

What is your conception of the objectives?

Secretary BRUCKER. Well, if you will pardon me, I suppose my conception is very inadequate, and I want to say that as a preface.

Men who are trained in this field just become glistening in their eye when they talk about the possibilities of exploration of space and the limitless opportunities in that field. All I can do is to interpret that which I see and that which I hear. And from that I gleaned this: That they think we haven't gotten to the outside edge of the first beginning of the lowest step of the portals to the place where we are to go.

There are so many things in the field that are interesting for national interest, international interest, and the military as well, that we don't understand yet or perceive how big it is.

Senator SALTONSTALL. Well, then, the objectives that are rather loosely set forth on page 2 of the bill are some of the objectives, but you wouldn't conceive that those are all of the objectives; or would you conceive that the Government has a pretty firm idea of what are the objectives in the conquest of space?

Secretary BRUCKER. I would say there are probably some additional objectives, and I think we have a pretty firm idea of what some of them are.

I do not think we understand yet all of the objectives or all of the things that will be found out yonder or opened up as time goes along.

Senator SALTONSTALL. Certainly it would be helpful, though, if we could set forth the objectives definitely, clearly and simply, and not open to conflicting interpretation, when we draft the bill.

Secretary BRUCKER. That is right.

Senator SALTONSTALL. Now, may I ask you a few technical questions?

RECOMMENDED CHANGES

You said the bill ought to be clarified.

Do you believe that the Board which is set up under section 4 should be controlled by government or by outside appointees?

Secretary BRUCKER. I feel, of course, that the people who are on that Board, whether they are from Government or appointed from private life, should represent the Government interests, and, as to the 8 and 7, or 9 and 8, I think it is perhaps a little unfortunate to have that division in number.

I think those who are appointed from private life just like persons who are appointed in any other department of Government, must be very carefully scrutinized for a conflict of interests.

I would think that at this very early stage, particularly, it would be unfortunate if we got anyone who is not thoroughly dedicated in that field; so I think that the Government interests ought to be paramount there.

Senator SALTONSTALL. Say that last sentence again?

Secretary BRUCKER. I think the Government's interest ought to be paramount.

Senator SALTONSTALL. In other words, you believe that the majority of the Board should be Government members.

Secretary BRUCKER. I do, Senator.

Senator SALTONSTALL. Now, should the Director be independent of the Board or should he be under the Board?

Secretary BRUCKER. Well, that, of course, is your option, and I wouldn't assume in any sense to try to think that point through except to say if I may:

There are, of course, two ways to do it.

The Director is in the nature of someone similar to the Secretary of Defense, who would have full power within the scope of his activities.

If he has that, he can move quickly with thorough facility and flexibility in the administration side. That is the strength of having the Director, of course—the man who decides things and who has the immediate responsibility, having an advisory Board, of course, who assists him in it; but he is it, and must be considered it. The responsibility must fall there.

If authority is divided, the tendency is—I won't say that this occurs; in other instances it has—but the tendency would be to have a debating society for a while until things by majority and minority finally got to the place where you had a solid and firm fix as to who was going to run it.

I really incline, for a new agency like this, to the directorship. I believe that the strength of that lies in the fact that this is young and we need action, and you get it that way.

Senator SALTONSTALL. That is not a very clear statement.

TRANSFERS TO NEW AGENCY

Section 8 of the bill, on the transfer of functions, seems to me to be rather ineffectively drawn and rather riskily drawn in its present language.

It would permit, for instance, this new Agency to take a function out of the Defense Department, providing the Secretary of Defense concurred and the President concurred—without the knowledge or approval of Congress.

Are you in favor of that section as it is written now?

Secretary BRUCKER. Now, which section is that, may I inquire again?

Senator SALTONSTALL. Section 8 on page 15.

I would say very frankly to you, I am not.

Secretary BRUCKER. I took it from your question that you were not.

The language of that—I sought to find out where that might have come from, and I was given a little information that I looked up or had looked up for me, and I find that that language is lifted almost bodily—I won't say "lifted" but it parallels section 4 of Public Law 85–133, 85th Congress of August 14, 1957, with respect to the matters and duties that have to do with the Airways Modernization Act of 1957—and it is really identical, I think, almost word for word in some places.

Senator SALTONSTALL. The Airways Modernization Act hasn't quite the national and international significance that this has, does it?

Secretary BRUCKER. No; it does not.

I merely give you that as an assistance if you want to check it and see.

Senator SALTONSTALL. Well, you are a little leary about it yourself.

Secretary BRUCKER. I am a little on the side of the question of where it came from and what is its effect, and I looked it up because of that interest and concern.

Senator SALTONSTALL. Now, I have several questions that have been given to me to ask here, Mr. Brucker, and I want to ask my own first, very briefly. So you will be very brief.

Secretary BRUCKER. All right.

OBLIGATION OF SERVICE AFTER TRAINING

Senator SALTONSTALL. At the bottom of page 10, line 24, in section 6 (b) (12), if a man goes out of the Agency for training—he would only have to come back and work for 3 times the length of any time that he had off in training.

Isn't that too short a time to be obligated to serve after training?

If a man is given 6 months to be trained, then he is only required to work for 18 months.

Secretary BRUCKER. I get your question about that, but I think they intended to have him a little longer than 6 months. I think they intended to give him probably a couple of years of very high development college. But if it is a question of contrasting that time; I agree.

PAY SCALES IN NEW AGENCY

Senator SALTONSTALL. Also one other question:

In section 6 (b) (2), at the bottom of page 6, the last line, and the first part of page 7, the bill provides for Agency employees to be paid at rates comparable with rates paid to non-Federal employees for similar work.

Wouldn't that throw the wage rates for civilian employment in the Department of Defense out of kilter?

Secretary BRUCKER. Well, there is that disproportionate relationship there. I think you could correct that, though.

RELATIONS WITH OTHER NATIONS

Senator SALTONSTALL. Now, do you think this organization which we establish for space activities has any bearing on our relations with other nations?

Does it have a foreign policy implication?

Secretary BRUCKER. Yes; of course it does. It has that implication.

Senator SALTONSTALL. And an important one, isn't it?

Secretary BRUCKER. Yes; it is.

Senator SALTONSTALL. And do you believe we should go it alone, or should we work with other countries as far as we can?

Secretary BRUCKER. Oh, I think the latter.

Senator SALTONSTALL. In other words, we have got to, in a matter of this kind, give them information and expect to get some in return, as far as we can.

Secretary BRUCKER. That is right.

Senator SALTONSTALL. Without impairing our security.

Secretary BRUCKER. Most certainly; and we have done that in connection with the orbiting of the 2 satellites that we put up, Explorers I and III, and we have given complete information to the world on the orbiting and all of the characteristics of those 2.

Senator SALTONSTALL. Does the bill require anything on international cooperation?

Secretary BRUCKER. Does it require anything?

Senator SALTONSTALL. Yes.

Or does it suggest anything?

Secretary BRUCKER. It suggests it, but it does not require it. That is my recollection.

Senator SALTONSTALL. It is a question of interpretation, really.

Secretary BRUCKER. That is right.

COMPARATIVE APPROPRIATIONS

Senator SALTONSTALL. How much on an appropriation basis, broadly speaking, do you believe we should put into this new Agency as opposed, we will say, to adding to appropriations for defense requirements that we know about.

What proportion should be put into this new program?

Have you any idea? Have you thought about that?

Secretary BRUCKER. I have not, because I know the military side through ARPA, but I have not given attention to the civilian side. I regret I am not prepared to answer that question, Senator.

Senator GREEN (pounding gavel). I have to remind the Senator his time is up.

Senator SALTONSTALL. Thank you, Mr. Secretary. I have been forcibly reminded that my time is up.

Senator GREEN. Mr. Anderson, do you have some questions?

Senator ANDERSON. Off the record, Mr. Secretary.

(Discussion off the record.)

ARMY INTEREST IN SPACE

Senator ANDERSON. Mr. Secretary, you say in your statement on page 2, and I am quoting now from it:

> Immediate applications which have particular significance for the Army include reconnaissance, both visual and electronic; communications missions of many kinds; meteorological observations which might lead to better weather predictions; mapping and geodesy, for which the Army has a primary responsibility; and, finally, the employment of satellites and space vehicles as space laboratories for continuing basic and development research benefiting all potential and actual users of space.

You say these aren't universally the Department of the Army, but if those are Army problems, what is left for the civilian agency?

Secretary BRUCKER. Well, I think the whole thing is left. I just suggested that these are portions in which we have an interest. It is not an overriding interest in the sense of these satellites and space vehicles and space laboratories for continuing basic and development research benefiting our potential and actual users of space.

It is more the statement of our overall or general interest; and, in some cases, in a project, it will be probably primary, but, in most cases, I would assume that it would not.

Senator ANDERSON. Were you familiar with the statement of Dr. Simon Ramo that about 90 percent of all of it would be military?

Secretary BRUCKER. I heard that. I just don't go along with it.

Senator ANDERSON. It is a little large, isn't it?

Secretary BRUCKER. I thought it was on the large side.

Senator ANDERSON. Yes.

ARMY EXPERIENCE WITH NACA

What has been the Army's experience with the National Advisory Committee on Aeronautics?

Secretary BRUCKER. The NACA experience has been very good, very cooperative, Senator.

Senator ANDERSON. When you get into a project with NACA, who in the ordinary terms of business are the project managers, the Army? The military?

Secretary BRUCKER. If the Army has something, of course, we expect to be the manager. Research and Development would be directly the manager for us.

Senator ANDERSON. The way you work with NACA is that you ask them to do a project.

Secretary BRUCKER. That is right.

Senator ANDERSON. When you ask them to do that, don't you take full responsibility for it? Aren't you project managers?

Secretary BRUCKER. I assume we are. I haven't any particular one in mind. I have to assume because I believe that is the way it operates.

Senator ANDERSON. You say this Space Agency which might succeed it will have—I am quoting now from page 5, the top of the page, the first full paragraph:

> * * * will have major dependence upon the Department of Defense for a long time to come.

So that the Space Agency would have some responsibility along with it.

Farther on you say:

> I believe the Department of Defense should be assured the same working relationship with the proposed NASA as it now has with the National Advisory Committee on Aeronautics.

Since you are the project manager for the Advisory Committee, you would likewise be the project manager for the Space Committee.

Secretary BRUCKER. Well, I would assume the project, if it is a military project, would be definitely recognized by the NASA Director and that we would go right ahead with whatever the project is when it is cleared and coordinated.

Senator ANDERSON. Yes, but you run the show.

Secretary BRUCKER. That is right.

POSSIBLE MILITARY LIAISON GROUP IN NEW AGENCY

Senator ANDERSON. You state here on page 5:

> * * * fully adequate military liaison will be established and maintained with the working group of the Agency to the end that military requirements are given adequate consideration.

Do you think such an advisory group should be provided for in the legislation or should we start by departmental order?

Secretary BRUCKER. Well, I don't believe that at this time it is necessary to set it up, Senator. I know that it is set up, for instance, in connection with the Atomic Energy Commission with General Loper over there in our office. If it is set up, it ought to be the converse of it this time and set up in the NACA.

Senator ANDERSON. You know very well the way General Loper works with the Atomic Energy Commission and the Joint Committee on Atomic Energy. There is no conflict between General Loper and the rest of us. We have the finest of a working relationship.

Do you think that is what ought to be set up here maybe?

Secretary BRUCKER. I don't think that it is necessary to set it up at the present time by statute. I think that we had better feel our way in the administration of it first. I don't anticipate that there will be any lack of complete liaison between the two. That doesn't exist between NACA and the Defense now, and I would see no reason to interpose it at the next jump on NASA. However, the time might come where that would be necessary, as it apparently did in the Atomic Energy Commission and Defense, and it was placed in the statute for that reason. But I wouldn't see any great necessity to put it in now. I would rather see it start with good administration first, and I think we can do it.

Sneator ANDERSON. In trying to get good administration, ARPA is now in Defense and some of its functions are going to be transferred to the new Agency.

Secretary BRUCKER. Yes.

Senator ANDERSON. The Manhattan project was in Defense and then it was transferred to a civilian agency, but they did set up a military liaison committee at the very beginning and no damage resulted, did it? Go back over——

Secretary BRUCKER. No. As a matter of fact, it worked out very well.

Senator ANDERSON. I think so, too.

Secretary BRUCKER. I have no doubt, though, that those things will work out, but what I have in mind is this. ARPA is so specially set up in Defense and has a special function there that I would anticipate that that would act as a military liaison agency along with everything else, that it would be a splendid group, and I would like to see it tried. I think not only the individual who holds the office but I think the will to get along over there and the will to have the liaison exists, and I would like to see that function.

Senator ANDERSON. But you say "specialized agency." My heavens, Manhattan project was a specialized agency, wasn't it?

Secretary BRUCKER. Yes.

Senator ANDERSON. And yet it transferred this liaison committee without any difficulty.

Secretary BRUCKER. Well, there was a little difference, but I wouldn't point that out. I can see your point, and it is a very good one, that you could have a military liaison committee by statute. I just feel that it isn't necessary, but if the Congress sees fit to do it, certainly it is not inapropos.

Senator ANDERSON. The reason I raised it is that I recognize that when the Agency has administrative responsibilities, then the liaison

committee with other groups works very well, and the AEC had administrative responsibility. It got on with the building of bombs, the design of the hardware, development of reactors, all those things, but somebody stood there to keep constant contact with the Congress and military to see that military requirements were met, and you would have to admit that military requirements have been met.

Secretary BRUCKER. Oh yes. There have been very good relations. It has been an extremely able and fine representation, too.

Senator ANDERSON. Now, you said that General Medaris was at Huntsville. How do you think we would have gotten along in setting up an Atomic Energy Commission by saying to General Groves, you go to Montana?

Don't you think the comments of General Medaris were of importance and should have been obtained? I am not criticizing the Army for not getting them. You only had 24 hours. But don't you think it would have been better to have taken enough time so that whoever was gathering up opinions could have gathered one from General Medaris who has a great responsibility?

Secretary BRUCKER. I think that it is very worthwhile to get General Medaris' viewpoint on this and other things of similar nature in which he is involved, and I am most anxious to say to you that it is valuable to get it.

MAN IN SPACE PROJECT

Senator ANDERSON. Now, Mr. von Braun had a project of sending a man up 150 miles or so into space and trying to return him. That has been killed, hasn't it?

Secretary BRUCKER. I don't know that it has been killed. I know that he has——

Senator ANDERSON. Well, it has been discouraged, at least.

Secretary BRUCKER. I don't believe that——

Senator ANDERSON. No?

Secretary BRUCKER. I don't believe it has been killed or discouraged. I think it is still pending. Let up put it that way.

Senator ANDERSON. I am going to have to quit my evening reading. Can we say it has been laid aside?

Secretary BRUCKER. No. I think it is still pending. Let us put it that way. I am not in my office but——

Senator ANDERSON. I will try to find a way we can get at it. Would you say while they are cooking these other things on the front part of the stove that this idea has been put on one of the back burners?

Secretary BRUCKER. Well, sir, I don't know that; frankly because it is in another echelon and I can't speak for that. But I can say that I feel that Dr. von Braun should be given certain encouragement and this is one of those things that I think he needs a little encouragement on.

Senator ANDERSON. I do, too, frankly. I don't think taking it and putting it into a lower shelf where it may never again see the light of day is what I would call enthusiastic encouragement. But maybe I don't calculate it.

Now, Dr. James Van Allen—a very able man——

Secretary BRUCKER. Can I just consult with the Research people?

Senator ANDERSON. Surely.

Secretary BRUCKER. I have just consulted with the Director of Research and Development and also the Deputy Chief, and I am assured that it is not on the back burner at all, that it is on the front burner, and that the matter is coming to my attention within the next 24 hours for lifting to another level.

Senator ANDERSON. Well, I am not that current, I admit.

I think, Mr. Chairman, that is all the questions I have.

Senator GREEN. Have you concluded?

Senator ANDERSON. Yes.

Senator GREEN. Mr. Mundt, have you any questions?

TYPES OF LEGISLATION

Senator MUNDT. Mr. Secretary, it seems to me that when we start out to write legislation in a new field of this type, with so many imponderables, unknowns, we can follow 1 of 3 general lines in trying to prepare the legislation.

We could set up by statute the general objectives and then rely, as this bill does in part—it seems to me in pretty large part—upon a White House adjudication as to a specific case, which of the two agencies gets the authority; or we could put into the legislative language specifically allocations of functions which, it seems to me, might freeze things; or we could try to attempt an allocation of these initial responsibilities between the Defense Department and the civilian functions with the White House authorized to make such transfers and reallocations as changing situations might dictate, perhaps with the customary formula of advising the committees of Congress as to the changes and the reasons therefor.

I think this bill goes a little far, leads a little bit in the direction of establishing these official responsibilities perhaps insofar as the civilian functions are concerned, but I don't think it goes equally far in the direction of staking out initial responsibilities for the Department of Defense.

I was encouraged by what you said when you implied that you would not resist, that you would approve a legislative attempt to make more specific the functions of the Department of Defense in this very important field.

Is that a pretty fair summation of your position?

Secretary BRUCKER. Yes, that is a fair statement.

Senator MUNDT. It seems to me that if we only establish general objectives in this legislation, you might almost as well not have a bill because the White House has the inherent authority anyhow, and I think we could go overboard very easily this early in the game to try to freeze and to fix forms and specific functions all the way down the line. The best we could hope to do is establish the initial areas of primary responsibility, granting that this is a fast-changing situation, and consequently the White House should have authority to make such transfers as fast-moving situations might dictate. When those transfers are made, I think they should be reported to the pertinent committees of the Congress, not only as to what has been done, but the reasons the steps were taken, and if Congress isn't satisfied, it would change the legislative authority.

Does that seem like a workable formula?

Secretary BRUCKER. Yes; that is a very logical formula for it.

Senator MUNDT. Now, my next questions, Mr. Secretary, I think are a little bit picayune inasmuch as they go to little details of the bill. I am not sure that you are the proper authority on the precise meaning of every word and phrase, but somebody has to speak out on it and, you know, I would like to have your opinion, and if you don't know, maybe you can indicate who can answer the questions.

ACCEPTANCE OF CONTRIBUTIONS

In section 6 (b) (12) on page 11, for example, line 9—

To the extent authorized by the Director—

says the bill—

contributions may be made by private sources and accepted by employees receiving training in non-Federal facilities without regard to the provisions of section 1914 of title 18 of the United States Code.

Now, I am wondering why we do that, how far that opens the door, and what their reason is.

Secretary BRUCKER. I don't know.

Senator MUNDT. I mean, I am a little bit uneasy about simply repealing a provision of the code that is found to be pretty essential as far as most echlons of government are concerned. If there are good and valid reasons for setting up certain conditions whereby employees receiving training in non-Federal facilities should be able to accept contributions—I don't mind opening up the door a little bit, but I hate kicking out the whole wall.

Secretary BRUCKER. Senator, I can only speculate and I would rather not do that. I would rather just say I don't know.

LIABILITY FOR DAMAGES

Senator MUNDT. You don't know. Do you know whether the language in section 14 is customary language—or maybe our counsel knows? Is it customary in bills of this kind to authorize the Agency of and by itself to make settlements in claims up to $5,000 for any loss, injury, death or damage to real or tangible property? Is that customary to have in the Defense Establishment? I certainly think it should be here, but it is certainly opening up a pretty prodigious series of expenditures over which Congress will have no control whatever.

Mr. WEISL. They do have such a provision in the law for the Department of Defense. It goes up to $2,500 I think. I think it may be raised up to $5,000.

Secretary BRUCKER. I am informed this is customary.

Senator MUNDT. Injuries to real or personal property?

Secretary BRUCKER. Yes; both.

Senator MUNDT. I see no reason why it shouldn't be done here. But I just noted that.

I note further that you pretty well obligate the Government beyond that because if a claim is for $1 million, you are authorized to pay the first $5,000. There would be an assumption of liability making it pretty hard for Congress to resist the rest. If that is standard operating procedure, I don't see any reason why we shouldn't provide here what is provided everywhere else.

Senator SALTONSTALL. Would the Senator yield for a question?

Senator MUNDT. Yes.

Senator SALTONSTALL. I would call the Senator's attention to the language in subsection 6 (b) (14) (a) authorizing settlement of claims when "such claim is presented to the agency in writing within 2 years after the accident * * *." Isn't that a pretty long time to be given the first notice of when an accident occurred? Is that customary?

Mr. WEISL. I don't know what the custom is, Senator, but in actions of law the statute of limitations governs and that usually runs between 1 year and 3 years.

Senator SALTONSTALL. But I think in our State notice has to be given substantially ahead of that time.

Mr. WEISL. Perhaps it is so in your State.

Senator MUNDT. Since this is standard operating procedure, Mr. Secretary, may I inquire, how do you report back to our Appropriations Committee on these items and how do you estimate the annual cost, collected in, so we never find out exactly how much outlay goes to this particular kind of thing?

Secretary BRUCKER. It is contained in the annual report to the Congress and it is reported by the Judge Advocate General, and there is a section of it that I think you will find under "Claims," and so forth. So it is reported to the Congress and very careful watch is made of it by the Judge Advocate General.

AUTHORITY FOR INTERNATIONAL COOPERATION

Senator MUNDT. On page 2 there has been some discussion about whether or not this bill permits international cooperation. Item (6) on page 2 specifically says—

> Cooperation by the United States with other nations and groups of nations in work done pursuant to this Act and in the peaceful application of the results thereof.

It would seem to me that that phrase simply conveys the authority you might need for international cooperation. Do you feel that that is inadequate?

Secretary BRUCKER. I think it does state a general attitude and a function, or at least a policy, to follow. It could be, of course, amplified. But I believe at least it is the basis on which could be pegged cooperation in the international field.

Senator MUNDT. To get to an item of cooperation, it involves a great variety of factors. Does this involve the security of the United States? Does this involve some secret formula that we are not prepared to share at this particular time?

I don't see how Congress sitting here now can anticipate the specific problem then that will have to be decided. It seems to me, in terms of our national security, in terms of the international situation, that in contact with the State Department, the military, intelligence, all we can do is open the door to that type of international cooperation when, as, and if it seems to settle the general application.

Secretary BRUCKER. Senator Mundt, I feel that those things that you mentioned are things which we do right along, to touch base with the different departments—that what we need is a policy guidance. I would hope in that field it wouldn't be spelled out too well or too thoroughly because it might not be all that you want. I think it

would be better to have it in general language, put the implications in there that we are going to touch base with the different departments; and, if you do get into the realm of restricted information or top secret, and so on, to have that portion of it state, just as the Atomic Energy Act does, what must be the basis of clearance and the prosecution for any violation of it, and so forth. But leave the overall guidance pretty general.

Senator MUNDT. I concur completely in that type of analysis of how you would operate in the international field.

That is all, Mr. Chairman. Thank you.

Senator GREEN. Mr. Secretary, unless you have something you wish to add—Mr. Counsel?

ARMY RELATIONSHIP TO NACA

Mr. WEISL. Mr. Secretary, I have one question. In your statement you say:

> I believe the Department of Defense should be assured the same working relationship with the proposed NASA as it now has with the National Advisory Committee on Aeronautics.

Now, would your attitude toward this bill be different if the National Advisory Committee on Aeronautics were not transferred to this new Space Agency?

Secretary BRUCKER. It is transferred, of course, to the——

Mr. WEISL. It is transferred, but would your attitude be different if it wasn't transferred?

Secretary BRUCKER. Well, I haven't thought of that, but I——

Mr. WEISL. Because there is no assurance in this bill that the same members will continue. It does transfer the members until their successors are appointed, but then the President can choose whatever members he wants on the Advisory Committee.

Secretary BRUCKER. No. I think——

Mr. WEISL. Are you basing your——

Secretary BRUCKER. No. Not alone on that.

Mr. WEISL. Not alone.

Secretary BRUCKER. I think that is one leg of the chair on which I am sitting when I say that. But I think this about it: that it demonstrates a cooperative "good will" between agencies in this field that is indicative and spells out that it can be done. What I am saying about NACA is that when you also add to that possibility and that fact something that has already succeeded in that field, you have pretty surely coalesced the two things together.

Mr. WEISL. I just wondered how you could be assured of the same kind of cooperation in this bill.

Secretary BRUCKER. I don't believe that there is any assurance on anything, but I think that as near as we can, this will spell it out by having that agency merged with it. If there were any doubt left, this would be the straw that would incline me surely to that.

Mr. WEISL. Thank you, Mr. Chairman. That is all I have.

Senator GREEN. Senator Saltonstall, did you have a further question?

Senator SALTONSTALL. I had one more after you are through. In my second time around I have one more question.

Senator GREEN. Go ahead.

Senator SALTONSTALL. Thank you, Senator.

CONQUEST OF OUTER SPACE

Mr. Brucker, you used the words "conquest of outer space" in your prepared statement. Have you thought out—could you identify a little more what you mean by that?

Secretary BRUCKER. That is sort of a generalism that is applied, I suppose, to the whole space beyond the atmosphere where man can live and survive in manned vehicles. And I would say that what I have in mind is that in all the spectrum of space beyond occupied atmospheric or possible occupied atmospheric space I meant everything that pertains to that realm.

You meant the word "conquest" particularly?

Senator SALTONSTALL. Well, you used that term "conquest of outer space" and I wanted you to identify it.

Secretary BRUCKER. Well, the word "conquest" may have a military connotation that I didn't think about.

Senator SALTONSTALL. Well, I wasn't thinking of that either.

Secretary BRUCKER. I didn't mean in any sense conquest by military means, or might, or anything of that kind. I meant the complete exploration and the complete obtaining of every bit of know-how and information that one can in that space beyond. I think that we both feel that that excludes automatically the lower level, the air-breathing level, and takes in all above that.

Senator SALTONSTALL. And following out that conception, I assume it isn't your idea that there should be a rivalry to conquer the outer space; but rather, that space should be used for peaceful purposes as far as we can and for purposes of our defense, but not with the idea of conquering and controlling it to the exclusion of other nations.

Secretary BRUCKER. Indeed not. I think we should certainly not use terms that confuse, and maybe that is one, "conquest." It is not that at all. Rather here is one field where there is no rivalry except who can best cooperate and who can best agree.

Senator SALTONSTALL. Now, just one other very broad question as to your philosophy, we will say, on this subject. What relationship should there be between the level of effort to be put into space research and conquest of space, as we have been discussing it, and, we will say, the achievement of important better living conditions here in the United States through conquest of disease, hunger, poverty, and so forth.

Secretary BRUCKER. I think they have a better relationship than a person on the surface would think because I believe that the exploration of space will relate itself to living conditions on the earth, and I do think that the living of our people may be affected somewhat by what occurs sooner or later. Maybe not now but later on.

Now, as to the division, nobody can say what, but I do think that without defining it we ought at the very start to give adequate enough money to this Space Agency so that it is somewhat comparable to that which we are doing in the military field.

Senator SALTONSTALL. I think that is all, Mr. Chairman. Thank you.

Senator GREEN. Thank you, Mr. Secretary. We thank you for your attendance and testimony here today.

Secretary BRUCKER. Thank you very much.

(The material for the record, supplied by Mr. Brucker, is as follows:)

DEPARTMENT OF THE ARMY,
Washington, D. C., May 20, 1958.

Hon. LYNDON B. JOHNSON,
Chairman, Special Committee on Space and Astronautics,
United States Senate.

DEAR SENATOR JOHNSON: During the hearing on S. 3609 before the Special Committee on Space and Astronautics during the afternoon of May 8, 1958, you requested that I submit my ideas for changes in the bill including suggestions for clarifying language. You also requested that I consult General Medaris prior to submitting the ideas and suggestions.

In accordance with your request, I recommend that the following changes be made in the text of S. 3609:

1. Page 2: Change lines 4 through 10 to read as follows:

"The Congress further declares that such activities should be directed by a civilian agency exercising control over aeronautical and space research sponsored by the United States, except insofar as such activities may be peculiar to or primarily associated with weapons systems or military operations, in which case the Department of Defense shall exercise control. The Congress, recognizing that the predetermination of the primary application of such activities in the vast new field of space may be impossible, hereby declares that responsibility in such areas shall be as agreed upon by the civilian agency created by this enactment and the Department of Defense, or as directed by the President."

2. Page 13: Add a new section as follows at the end of section 6 and renumber the succeeding sections:

"LIAISON"

"SEC. 7. The Director of the Agency and the Secretary of Defense shall jointly establish liaison between the Agency and the Department of Defense as required to insure joint effort, the interchange of information and the coordination of programs and to avoid duplication."

I have also consulted with General Medaris regarding these changes. He concurs that the change proposed above on page 2 of the bill would render the bill relatively more desirable than it is in its present form. He would, however, go even further and reword lines 7 through 10 as follows:

"Except insofar as such activities may be peculiar to or primarily associated with weapons systems or military operations, in which case the Department of Defense shall exercise control. The Congress, recognizing that the predetermination of the primary application of such activities in the vast new field of space may be impossible, hereby declares that where such clear-cut determination appears impossible, the Secretary of Defense shall be responsible for the determination of whether such projects should be carried out by the civilian agency or by the Department of Defense unless he is otherwise directed by the President."

General Medaris concurs in the addition of section 7, "Liaison," recommended above. General Medaris further recommends an additional change on page 3. He recommends that lines 16 through 23 be amended to read:

"SEC. 4. (a) There is hereby established the National Aeronautics and Space Board, hereinafter called the "Board" which shall be composed of not to exceed five members appointed by the President.

"(1) Two members of the Board shall be designated from the Department of Defense."

Although I have carefully considered the recommended changes proposed by General Medaris, I still believe, as I have indicated in my testimony, that the question of conflict between the National Aeronautics and Space Agency and the Department of Defense over the question of the assignment of responsibility for space projects has become somewhat overexaggerated and that there will be powerful influences tending to bring about cooperation and coordination between these two agencies. I also feel that the text of the bill as written with regard to the membership of the National Aeronautics and Space Board allows sufficient flexibility to permit the administration to name a workable number of members to this Board and to provide the required representation from the civilian scientific community, industry, and the Government. I therefore recommend the changes proposed in the second paragraph of this letter and that no changes be made relative to the membership of the Board.

As requested by the committee, I here have presented my personal views, together with the personal views of General Medaris where indicated, rather than endeavoring to present a coordinated official position of the Department of the Army or the Department of Defense.

Sincerely yours,

WILBER M. BRUCKER,
Secretary of the Army.

Senator GREEN. Our next witness is Mr. Garrison Norton, Assistant Secretary of the Navy for Air.

STATEMENT OF GARRISON NORTON, ASSISTANT SECRETARY OF THE NAVY FOR AIR

Senator GREEN. Mr. Norton, so the record may disclose your background and qualifications, I ask unanimous consent that we include a copy of your biographical sketch in the record.

Mr. NORTON. Yes, sir.

(The biography referred to is as follows:)

GARRISON NORTON, ASSISTANT SECRETARY OF THE NAVY FOR AIR

Mr. NORTON was born in Chicago in 1900. He was a Groton School graduate, 1919; Harvard, bachelor of arts 1923; and is a certified public accountant in New York and Illinois.

Member of staff, New York partner and general partner, Arthur Young & Co., accounting firm, New York, Chicago, etc., 1923–40: deputy general manager Home Owner's Loan Corporation, Washington, 1934; Assistant Chairman, Civil Aeronautics Authority, Washington, 1938.

Active duty United States Naval Reserve (aviator) 1940–45, captain, overseas service; Chairman, Naval Air Advisory Council.

Appointed Deputy Director, Office of Transport and Communications, Department of State, 1945; United States delegate, Civil Aviation Conference, Bermuda, 1946; in charge negotiations for settlement United States-British bases agreement, Bermuda, 1946; United States representative Civil Aviation Conference, Paris, 1946; United States delegate, First Assembly, Provisional International Civil Aviation Organization, Montreal, 1946.

Appointed Director, Office of Transport and Communications, Department of State, 1946; United States representative, discussion of International Air Transport Policy, London, 1946.

Appointed Assistant Secretary of State, 1947; Chairman Air Coordinating Committee; Chairman International meeting on Marine-Radio Aids to Navigation, New York and New London, 1947; Chairman United States delegation First Assembly, International Civil Aviation Organization (ICAO), Montreal, 1947; Chairman United States delegation, International Delegation to Commission on Multilateral Agreements, ICAO, Geneva, 1947; Chairman United States delegation U. N. Conference on an Inter-Governmental Maritime Organization, Geneva, 1948; Director, Export-Import Bank, 1948; Deputy Director, International Bank and Monetary Fund, 1948.

Resigned as Assistant Secretary of State, 1949; entered banking firm of Wm. A. M. Burden & Co. (New York) as special partner, 1949.

Resigned to accept assignment with Mr. Burden as consultant (Research and Development) to Secretary of the Air Force, 1951; consultant to Secretary and Assistant Secretary of the Air Force (R. and D.) 1952–55.

Appointed Assistant Secretary of the Navy for Air, 1956.

Senator GREEN. Now, the committee will be pleased to receive your statement.

Mr. NORTON. Mr. Chairman, I do not have a prepared statement to make. I have simply a general statement to the effect that the Navy supports wholeheartedly the intent as expressed by both the President and the Secretary of Defense with respect to this Agency.

We do have, however, grave misgivings about certain portions of this proposed bill as it is now drafted, and I am prepared, if you wish to have me do so, to be specific as to what our misgivings are in this respect.

Senator GREEN. Have you copies of your statement with you?

Mr. NORTON. Mr. Chairman, I do not have a prepared statement.

MISGIVINGS CONCERNING THE BILL

Senator GREEN. You state your misgivings on the bill.

Mr. NORTON. Yes, sir. My first misgiving occurs with respect to the sentence in section 2 beginning on line 4 of page 2 of the bill which reads as follows:

> The Congress further declares that such activities should be directed by a civilian agency exercising control over aeronautical and space research sponsored by the United States, except insofar as such activities may be peculiar to or primarily associated with weapons systems or military operations, in which case the agency may act in cooperation with, or on behalf of, the Department of Defense.

Mr. Chairman, I am strongly in sympathy with the spirit and philosophy back of this bill. If we were living in a different kind of world, I would certainly be in favor of complete civilian control in this matter, but unfortunately we are living in a world in which the existence of the United States is threatened every day, and the United States survival in my opinion should come first in our thinking with respect to this bill, and that basically is what bothers me about this sentence.

I believe the Secretary of Defense should decide what weapons systems should go to this new agency. At the very least I would like to see that word "may" contained in line 9 changed to "shall." I would prefer to see that entire sentence clarified and amplified in such a way as to make it clear that in order to assure adequate military consideration of these problems we would not have to go every time to the President.

Senator GREEN. That would change the meaning considerably.

Mr. NORTON. Yes, sir, it would.

Senator GREEN. "May" is permissive action by the Department of Defense and if you say "shall," then you are giving direction to the Department of Defense, are you not?

Mr. WEISL. The Agency "shall."

Senator GREEN. Yes, I understand.

Mr. WEISL. The new Agency.

Senator GREEN. The Agency may act in cooperation with or on behalf of the Department of Defense, and you are proposing that it say "The Agency shall act in cooperation with or on behalf of the Department of Defense."

It directs that action be taken.

Mr. NORTON. That is correct, yes, sir.

Senator GREEN. On the part of the Department of Defense.

Mr. NORTON. That is correct.

Senator GREEN. So it is not permissive. It is a command to the Department of Defense.

Mr. NORTON. It is a command, yes.

Senator GREEN. You believe it should be?

Mr. NORTON. I believe it should be, yes.

Senator GREEN. That is your recommendation?

Mr. NORTON. That is my recommendation.

Senator MUNDT. Will the chairman yield for a question?

Senator GREEN. Yes, if it is on this point.

Senator MUNDT. Yes, on this point, on this word.

Mr. Norton, very respectfully I do not believe that changing the word "may" to the word "shall" is going to quite achieve the thing that you have in mind. I am entirely in sympathy with your objective and it has been brought out by 2 or 3 previous witnesses. But then you come to the very sticky question how are you going to interpret the word "behalf."

I want to be sure the Department of Defense is in this act and I would hate to have it construed by some solicitor that by using the word "shall" that the agency then has the initial responsibility and is doing it in lieu of the Department of Defense.

Mr. NORTON. I agree with you entirely, Senator.

Senator MUNDT. I want the Department of Defense to have some initial authority and I think you do.

Mr. NORTON. I agree with you, sir. I was not suggesting to this committee that the only change in that sentence should be from "may" to "shall."

I was simply pointing that word out as being perhaps the focal point.

Senator GREEN. The whole sentence needs rewriting.

Mr. NORTON. The whole sentence needs rewriting and clarification; yes.

Senator GREEN. The original idea was to make it permissive, was it not, and now this makes it mandatory.

Mr. NORTON. Yes, sir.

Senator GREEN. Go ahead.

Mr. NORTON. My next point is with respect to the compensation which is to be paid to this director. On page 3, line 9——

Senator SALTONSTALL. Mr. Chairman, as Mr. Norton has not got a prepared statement, may we ask him questions before he gets away on another point?

Senator GREEN. He says he has no prepared statement.

Senator SALTONSTALL. I would like to ask him a question on the point he has just been making before he hops off to another one.

Senator GREEN. Certainly, you mask ask it.

ADEQUACY OF POLICY OBJECTIVES

Senator SALTONSTALL. Thank you, sir. Mr. Norton, you covered lines 4 to 10 on page 2 in the policy declaration on the question of the cooperation between the civilian agency and the Department of Defense.

Do you think that the policy objectives, which of course concern the Department of Defense and in turn concern the civilian agency, are adequately set forth? What is your conception of the objectives that should be put in this bill?

Mr. NORTON. Senator Saltonstall, in my opinion this act should make it clear beyond any question that matters of military concern in this area shall be under the control of the Secretary of Defense, and that if the Secretary of Defense sees fit to pass these matters along to this new Agency in the same way in which he now passes them along to the NACA that he should be the controlling factor in that as far as military and weapons systems are concerned.

And why worry about that sentence? It is simply this. That it could be interpreted by some future Director to take over the entire

matter of aeronautical and space travel regardless of whether it is associated with defense of the country or not.

Senator SALTONSTALL. I agree and I understand what you mean, but I had more in mind. If you will look at line 12 and following on page 2 of the bill through the second line of the next page, do you agree with those policy objectives?

Mr. NORTON. Yes, sir; I think they are fine objectives.

Senator SALTONSTALL. And are they clearly set forth?

Mr. NORTON. I think they are reasonably clearly set forth; yes, sir.

Senator SALTONSTALL. In other words, your thought with relation to the objectives of the research and development of the ability to go into space is generally covered by these policy objectives?

Mr. NORTON. I would say yes, but the thing that is not covered in my opinion is the ability of the Secretary of Defense to determine and to decide what weapons systems in this field he desires to have this Agency take over.

I am talking about defense of the country now. I am not talking about general research in space.

I am talking about specific weapons systems. This act, drawn up as it is now, is written in such a way that this agency could take over everything. It could take over all weapons systems. It could take over all aeronautical as well as space vehicles.

Senator SALTONSTALL. It is a watering down of the power of the Secretary of Defense from being the top defense policymaker of our country.

Mr. NORTON. It could be; yes, sir.

Senator SALTONSTALL. Thank you.

SALARY OF THE DIRECTOR

Mr. NORTON. My next misgiving arises in connection with the salary proposed to be paid to this Director. In the first place this pay rate of $22,500 is inconsistent with the prevailing rates that are referred to later on in this same bill as being the rates that this Director can pay to key individuals whom he wishes to bring into the organization. This business of fixing the salary of the Director, who himself should be one of the leading scientists of the country, at a salary rate which is probably going to be half or maybe only a third of the rates that he is going to have to pay to get the kind of people he needs, seems to me penny wise. It is in sharp contrast to what we know the Russians are doing themselves, where they have not only picked their top scientists for this kind of work, but have seen to it that their compensation was the highest in the land, and I submit to this committee that we are not being very wise if we fix that salary——

Senator SALTONSTALL. In that connection are you referring to the top of page 7, lines 1 to 4, in section 6 (b) (2)?

Mr. NORTON. I am referring to section 3, Senator, to line 9 on page 3.

COMPARABLE PAY SCALES

Senator SALTONSTALL. Yes, but are you not referring also to the matter of paying agency employees at rates comparable with the prevailing rates paid by non-Federal employers for similar work?

Mr. NORTON. Yes, sir; that is right, on page 7.

Senator SALTONSTALL. From your experience in the Department of Defense and from your experience in the Department of State, while it may be good in some respects, isn't that going to throw everything out of kilter?

Mr. NORTON. Well, sir, you have put your finger on 1 of my 7 points that I was going to make. I would be very glad to jump right to it now and make it. The provision in section 6 (b) (2) here which begins on page 6, line 17, and runs along through the top of page 7 down through line 4, is in my opinion a very good provision because it recognizes the facts of life. If you are going to get the quality of people you want for this Agency, you are going to have to do just what this thing says here.

On the other hand, it is going to have a bad effect on other Government agencies and laboratories, there is no doubt about that.

Senator SALTONSTALL. It just isn't practical, is it?

Mr. NORTON. Yes, sir; I think it is practical. I think it is actually in use right now. I am not too sure what this so-called IDA organization is or how it is set up—the Institute of Defense Analysis—but I think you will find that that is being used now as a means of getting adequate salaries for people like Dr. York, for example, who is now serving as the Scientific Director of ARPA, the Advanced Research Projects Agency.

Senator SALTONSTALL. What is that organization that you just mentioned?

Mr. NORTON. This IDA, I am not too sure myself what this organization is. It has some private and some Government sponsorship, I believe, but it is a device——

Mr. SALTONSTALL. Those men are not being paid those sums out of appropriations by the Congress.

Mr. NORTON. No, I think not. I think that a portion of these salaries is paid out of other sources through this Institute of Defense Analysis.

Senator GREEN. Are you proposing a substitute?

Mr. NORTON. No, sir; I am not. I am endorsing this part of the bill.

Senator GREEN. Where you find fault with the present act would you possibly offer substitutes that in your opinion are preferable?

Mr. NORTON. I am endorsing this part of the bill, Senator, but I am simply inviting attention to the difficulty that this is going to create with respect to our Government laboratories.

Senator GREEN. I thought you said it was capable of different constructions.

Mr. NORTON. I'm sorry, I didn't quite hear your question.

Senator GREEN. I say do you think that in its present draft it is capable of different constructions?

Mr. NORTON. No, sir; I think the present draft in this respect is quite clear, and I think it is a good draft here. I think it is a fine thing that this Director will be able to go out and on the basis of pay at rates which are reasonably comparable with prevailing rates, to get the people he needs. I think that is a very fine thing to do. But I am simply pointing out that it is going to create a very considerable difficulty. Let me just give you an example. I am not saying this is an actual case at all. We have Dr. McLean who is the Director of our Naval Ordnance Test Station. He is the in-

ventor of the Sidewinder missile. He is a very brilliant scientist. He is being paid a rate which I think is close to if not the actual maximum that we can pay him under the law.

Now it is quite possible that the Director of this new agency would take a look and say, "We will ask Dr. McLean. It would be very nice to have him in this agency, and we can offer him $40,000."

This kind of thing could create a very serious problem for all 3 services, that is, the laboratories supported by all 3 services.

Senator GREEN. Are you proposing an improvement of the present draft?

Mr. NORTON. No, sir, I am not in that respect. I am saying we should stand on the present draft. I think what I am really proposing here, if I am proposing anything, is that we perhaps look at the rate of pay that we can pay all these people and perhaps move them up to what they should be getting.

Senator GREEN. Then you are in favor of the draft as it stands?

Mr. NORTON. Yes, sir; in this respect, I am.

Senator GREEN. Very well, you may proceed.

COMPOSITION OF THE BOARD

Mr. NORTON. My next point occurs with respect to the membership of the proposed Aeronautics and Space Board, which is referred to in section 4, on page 3, of the bill.

The composition of this Board is a sort of reversal of the NACA type of board. In the first place, on the NACA, which is a board also of 17, not more than 7 can be from outside the Government and the other 10, or a majority of the Board, are in the Government.

Furthermore, of that 10, 5 are in the Defense Establishment. I believe in the case of the NACA it calls for 2 Air Force, 2 Navy, and 1 Defense Department. Now this new Board more or less reverses that and says that out of the 17, no more than 8 shall be designated from departments or agencies of the Government, and it stipulates that of this group, at least 1 shall be from the Department of Defense.

In other words, it sets up a majority of civilians, and it only provides for one from the Department of Defense.

Now, I just do not feel that this relationship of 16 to 1, which is possible under this bill, is very realistic in the face of what I would call the facts of life here.

Senator SALTONSTALL. Mr. Chairman, might I ask a question on that point?

Senator GREEN. Certainly.

Senator SALTONSTALL. Do you believe in the principle of the NACA, that the majority should be with the Government?

Mr. NORTON. I believe in the principle of the NACA; yes.

Senator SALTONSTALL. And you also believe, of course, as you have just stated that there should be more representatives of the Department of Defense. I am inclined to agree with you. Now the other question in that connection which I would like to ask you—perhaps you are coming to it—do you believe that this should be a consulting board or do you believe that as with the NACA it should have the responsibility and the directive to carry out——

Mr. NORTON. That was my very next point, Senator, and I will be glad to come to it right now.

FUNCTIONS OF THE BOARD

My fourth point here has to do with the functions of the Board as set forth on page 4 beginning in section 5 (a). Here again Senator Saltonstall points out that this bill differs from the NACA in that the Board is advisory only. It puts full responsibility on one underpaid Director. At least I think he is underpaid. There is no obligation on this Director to carry out the advice of this Board. I think again the NACA organization, which is more like a business board of directors, making the Director an agent of the Board is more realistic in the face of the kind of world we are living in today. Now I do want to say that I think I appreciate the philosophy back of this business about the functions of the Board as well as the membership.

I think if we were living in another kind of world and did not have the kind of enemies that we have, it would be a very fine thing to see this whole thing in the hands of civilians, our most outstanding scientists who are appointed to this Board purely on their record as scientists, but I do feel that under the circumstances, with the kind of government in Russia that we have today, that this is simply not realistic.

Senator SALTONSTALL. Mr. Chairman, could I be permitted to ask one question out of order because I am afraid I have got to leave and I am awfully anxious to get Mr. Norton's opinion on one other question.

Senator GREEN. Certainly you may ask your question.

Senator SALTONSTALL. Thank you, sir.

TRANSFER OF AGENCIES

On page 15, section 8, I am very anxious to know what is your opinion of that section. Should it be left the way it is or should it be changed or should it be eliminated? I hope that that is your seventh point.

Mr. NORTON. This has to do, Senator, with the transfer to itself of other Government agencies or departments.

Senator SALTONSTALL. Yes, sir.

Mr. NORTON. Well here, Senator, my thinking about that section would be very much conditioned on what sort of action was taken with respect to my first point.

My first point you may recall had to do with this. Now if the bill were very clear and positive about my first point, I would not have very many misgivings about section 8.

Senator SALTONSTALL. In other words, your principal objection to the bill as it is now written, or your principal idea of how to improve it, is to clarify the relationship between the Department of Defense and this new agency.

Mr. NORTON. That is it exactly.

Senator SALTONSTALL. And to make certain that the Department has predominance in the field of military security.

Mr. NORTON. Yes, sir; that is it exactly.

Senator SALTONSTALL. Thank you.

Mr. NORTON. Shall I go ahead?

Senator GREEN. Mr. Norton, there is a call from the Senate and we feel we must leave, and so I am going to ask you to put in writing

your recommendations for changes, the reasons for them, and supply them to the committee.

Are you willing to do that?

Mr. NORTON. I will be glad to do that; yes, sir.

Senator GREEN. That will make it more satisfactory to both sides. We will then have that understanding. This committee will adjourn until 10 a. m., Tuesday, May 13. We will reconvene in the Senate caucus room to hear Dr. Hugh Dryden, the Director of the National Advisory Committee for Aeronautics.

We stand adjourned.

(Whereupon, at 3:45 p. m., the committee adjourned to reconvene at 10 a. m., Tuesday, May 13, 1958.)

(The material for the record, supplied by Mr. Norton, is as follows:)

THE ASSISTANT SECRETARY OF THE NAVY FOR AIR,
Washington, May 19, 1958.

Hon. LYNDON B. JOHNSON,
Chairman, Senate Special Committee on Space and Astronautics,
United States Senate, Washington, D. C.

MY DEAR MR. CHAIRMAN: During my appearance before the Senate Special Committee on Space and Astronautics on May 8, I discussed several points contained in the draft bill for the establishment of a National Aeronautics and Space Agency that I feel must be modified if this Agency is to serve the best interests of the Nation. Lack of time prevented me from developing fully these points during my oral testimony. Consequently, the acting chairman requested that I submit to the committee my recommendations in writing. The following comments, of course, stem from my previous testimony.

The Navy has firm requirements for militarily useful vehicles in a space program, chiefly as reconnaissance, communication, surveillance, and navigational devices. The other services have similar interests and requirements, however, equally as strong as the Navy's. I believe, therefore, that the services are in agreement that no military department has so overriding a need and capability in the space field as to warrant the exclusion of the other military departments. Space programs will be of such technical complexity, importance, and expense that overall military requirements can best be met through a national program, using the totality of best resources available to the Government.

The Navy is fully in accord with the objectives and intent of this bill as expressed by the President in his message to the Congress. The interests of the Nation and the capabilities of the Navy in the defense of the Nation are best served by a broad national research and development program in space work. In view of its splendid work in research in aeronautics and allied fields and the beginning it has made in space programs, the National Advisory Committee for Aeronautics is the logical choice to act as the nucleus for a national agency devoted to aeronautical and space research.

However, in attempting to implement the philosophy of the President's objectives, the original language of the draft did not squarely and realistically face up to the military threat to the very existence of the United States. The Navy's major concern was the fact that the language of the draft appeared to vest ultimate responsibility for the development of space weapon systems in the proposed new agency rather than in the Department of Defense. The new agency could have excluded the Department of Defense from its consideration of aeronautical and space programs and could have taken over the whole field irrespective of the Defense programs required by the military departments.

This was the crux of Navy objections to the draft bill in its original form. Because the bill did not provide for a clear delineation of civilian and military interests, I pointed out, as representative of the Navy, further specific sections which seemed likely to threaten our national security.

Thus, I noted that the language contained in section 6 (a) (3) which gives the new Agency a mandate to "develop, test, launch, and operate aeronautical and space vehicles" would permit it to duplicate or split the functions of the military departments, such as those performed by the Bureau of Aeronautics or the Air Research and Development Command, in developing and operating aeronautical and space vehicles.

Similarly, I noted that the contractual authority vested in the new Agency by section 6 (b) (5) could constitute a source of competition with the military departments for major programs in the aircraft and missile industries, leading to increased costs and duplication.

Of particular concern was the composition of the proposed National Aeronautics and Space Board specified in section 4 (a) of the bill. As originally written that section called for a majority of the Board to be appointed from outside the Government. Furthermore the minority representation from Government agencies included only one member from the Department of Defense.

The Navy's concern over these specific provisions of the bill was prompted in large measure by the fact that the bill did not make it clear that the Department of Defense would retain control over the development of space weapon systems. As I stated in my testimony, with this point clarified and insured, the Navy's misgivings on other specific points would fade.

Since my testimony, however, I have been advised by the General Counsel of the Department of Defense that specific language has been recommended for insertion in section 2 of the bill which would make clear that activities peculiar to or primarily associated with weapon systems or military operations will be the responsibility of the Department of Defense. Furthermore, a desirable change has been made in the composition of the Board of the new agency. It has been recommended that the majority of the members of the Board should be from within the Government and that at least three members of this Board should be from the Department of Defense.

In view of these changes, the principal concerns of the Navy, to which I have adverted above, have now been removed. The Navy is fully in accord with the language of the bill as revised.

There remain several minor points in my own mind. In commenting on these points, I should like to emphasize that they are matters of personal opinion and in no way affect the Navy's support of the bill.

One of these points relates to the functions of the Board as set forth in section 5 (a) in relation to the functions and authority of the Director of the Agency. As opposed to the very effective NACA organization, the Board for the new Agency acts in an advisory capacity only to the Director. The Director is under no obligation to carry out the advice of the Board. The Director has a completely free hand in the organization of the Agency and in the direction research shall take. I am personally of the opinion that responsibilities of such magnitude should not devolve upon the single Director but should be vested in the Board, representing the views of both military and civilian. I think that the National Aeronautics and Space Board should preferably be constituted in a manner similar to the NACA and that the Board have the responsibility and the directive authority for the functions of the Agency.

The other point concerns the provisions of the act for the pay of employees of the Agency and for the pay of the Director. I am fully in accord with the provisions of section 6 (b) (2) which permit the Director to pay at rates comparable to industry rates. The excellent and dedicated men in Government scientific work have long deserved this sort of recognition. I must point out, however, the inequities that would result and the difficulties that other Government agencies would face in retaining and recruiting scientific personnel and keeping up their morale should this Agency alone pay at industry rates. My own feeling is that all Government scientific workers should be paid at rates competitive with industry.

I also feel that the compensation provided for the Director is not realistic. Like his employees, he should be paid at a level comparable to industry salaries.

These personal reservations are minor in nature and do not, of course, mean that I do not support the revised bill. My sole interest, both officially and personally, has been to insure that the defense needs of the Nation in the aeronautical and space area are not lost in the undeniably appealing philosophy of civilian control over space travel.

Sincerely yours,

GARRISON NORTON.

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